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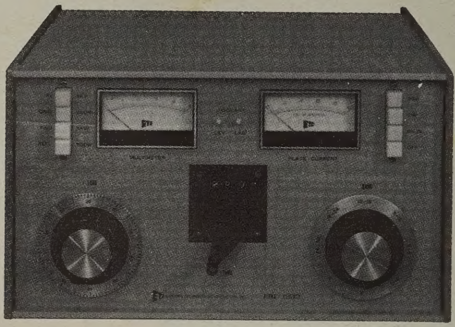
by ETO



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CQ The Radio Amateur's Journal

ON THE COVER: World War II still raged on both the European and the Pacific fronts when *CQ* first saw light of day. Capturing the mood of that dark time, *CQ* staff photographer Larry Mulvehill, WB2ZPI, brings together some of the items that evoked many a dream in the minds of Hams gone to war, or would-be Hams waiting for V-Day.

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ZERO BIAS

EDITORIAL

In January 1945 I was one month shy of being seven and WW II still had about seven months to go. Radio was something you listened to, to be entertained, enthralled, and informed (as much as my folks would let me). It would be six or seven more years before I heard about or saw an issue of *CQ* magazine, let alone knew anything about amateur radio. What I've put together or learned about the early years of *CQ* has mainly been anecdotal, told by various people who were either associated with *CQ* or knew people who were. As a history, most of the stories probably were sanitized, as most histories are, told to amuse rather than to contribute to a literal record.

What you learn (or should learn) early on in life are two things. The first is our heroes are human and some do have feet of clay, making them far less than perfect. The second is some things are not better off left to posterity, but are best forgotten. What is important to remember are the ideas, the accomplishments, and with some, the true aura of brilliance with which they shone. Of course, this is best done in hindsight, because at the time I had the privilege to meet and know some of these people, they just struck me as quirky and as playing with a few cards less than a full deck. I knew they were bright and innovative, but to what extent or how unique they were (and some still are) took a bit of time to sink in. Also, when you work with or associate with a number of people who thusly shine, you tend to think everyone is that way, and therefore they really don't stand out very much, even though they should.

When I began to think about what I would write for this issue, I thought I'd start at the point when I became aware of both *CQ* and amateur radio. I started going through my bound volumes of *CQ*, beginning with 1952, and I thought I would keep looking until something struck me as familiar or evoked a memory. It took several bound volumes before anything began to trigger a response, although there were issues that had my call letters written on the cover and penciled notes next to parts lists and schematics for construction projects I must have at least tried to build. I looked at and read ads for parts and equipment that must have astounded me (and many others) at the time, but I simply don't remember them now. All the names, all the companies, all the gear—simply gone.

Looking at the pictures in these early issues, one could easily draw the conclusion that the amateurs of those days were much older than today's amateurs. Not so. It's just that everyone looked older than their counterparts today. What is most striking is that most of the men and women shown are what we politely call "dressed up." Most of the men are wearing suits and ties and the women are dressed up equally, including hats. Maybe that's why they looked older to me.

Somewhere in 1955, towards the end of that year, the warm glow of remembrance started, and I avidly reread articles that I hadn't looked at in 40 years. What is striking, though not at first, are the quantum leaps in technology and the magnificent bounty of original thinking and creativity. At first glance, the articles depict gear and situations that by today's standards are ancient and archaic. Achievements in DX and VHF which were widely hailed at the time are commonplace today, given the simplest of gear. The major difference which becomes evident and clear is that amateurs of that day were thinking and creating in terms that hadn't existed before and were making full use of available technology.

Little by little my desk became piled even higher than normal, as more and more bound volumes of *CQ* joined others in my research. The reading was (and is) fascinating. Torn pieces of paper served as bookmarks to note some transition or important happening, and I found myself marking more and more, to the point where I had to either become more selective in what attracted me or figure out if there was a class or group in which these things belonged.

The technical aspects came fast and furious, and then amateur radio's golden age of military surplus arrived, which illuminated the pages of *CQ* and made communication for everyone easy, simple, and possible. But throughout all of that, there was a very strong thread of people-oriented topics and articles siting what people were doing with amateur radio. First there was a "Stations Heard" section, whereby people listed the calls they heard. Then in March 1946 Herb Becker, W6QD, began *CQ's* first "DX Column," and in fact our first column. The next few months helped shape where *CQ* was going and still is going after 50 years.

The following month, April 1946, Amelia Black, W1NVP, started a monthly column called "The YL's Frequency," which was designed to give women more of a say in amateur radio affairs and encourage more women to take up the hobby. In June 1946 *CQ* introduced two features, again designed to increase participation in our hobby and to share what was happening. The first was regular articles and monthly coverage of propagation conditions written by Oliver Perry Ferrell. Although he was never a licensed amateur, Perry was a leading authority on propagation, shortwave listening, and many amateur radio related subjects. He truly was a fascinating man whose life and accomplishments would make a very exciting book. That same month Josephine Conklin, W9SLG, started *CQ's* first UHF column, which as I read it was written with tremendous expertise and authority. Thus, early on, during extremely chauvinistic times and in a very chauvinistic hobby, *CQ* had two leading columns directed by women. Maybe we've always been ahead of the times.

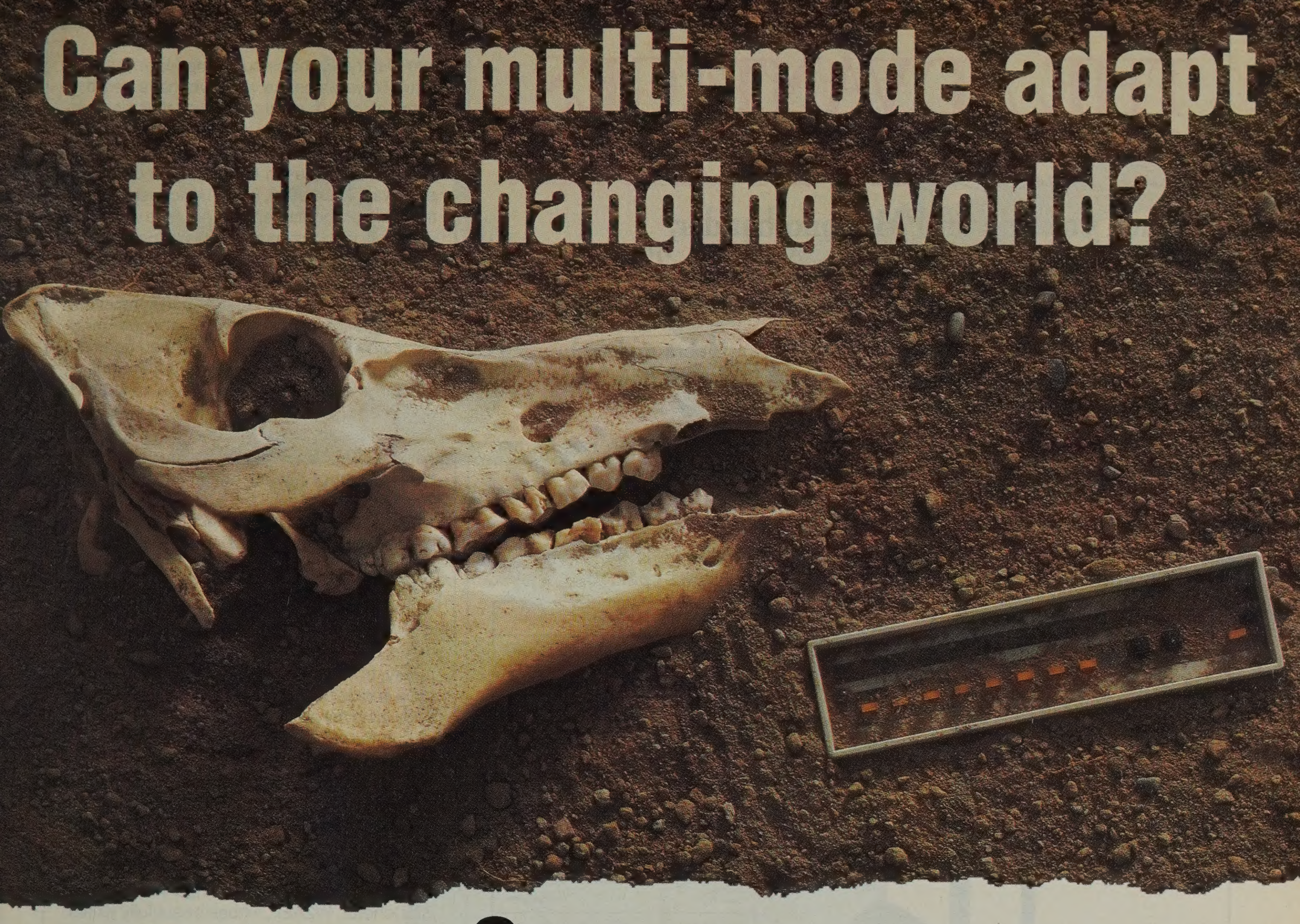
In this, *CQ's* 50th anniversary issue others may write about the glories of various stages in amateur radio, the advances in the hobby, and the truly miraculous gear we have to choose from today. Yes, all of that is amazing, especially in one's lifetime. However, to me, sitting at this desk in this place in time, the most miraculous thing is the people who sat here before, the multitude of authors, some eminently famous, some with only one article under their belts, all of whom pumped their blood in a sense in these pages over the past 50 years. Many who wrote in the early days are still writing today, sharing and imparting their experience and thoughts. That's amazing.

I've held this seat longer than anyone else during *CQ's* 50 year history—19 years out of my 31 year association. In my 31 years, and for all the years that went before, it has been the people—the writers, the columnists, and even our most beloved advertisers—who truly have made this possible. The hobby by itself is intrinsically exciting and filled with wonder and possibility, either an escape from reality or a direct plunge into it. However, the people change; they grow older and eventually pass on, some a memory, some just forgotten. As I reread almost 50 years of *CQ*, the people link emerged quite clearly. Almost everyone who came to work for *CQ* during these 50 years started out as either a friend of someone here or as a writer, or both. Each of us is directly linked back to that January 1945 issue.

I think and believe that John H. Potts, *CQ's* first Editor, would be pleased and proud to see how far we've come in 50 years. I'd like to think and believe that he'd be just as impressed and proud as I am of our fabulous team of contributors, columnists, and authors writing today. He perhaps would not immediately recognize some of the areas covered today, but he would instantly appreciate that after 50 years, the general precepts he set out in the very first editorial, and which are quoted here, are still being met.

"This, then is the raison d'être for *CQ*—a magazine for the radio amateur, with a particular invitation to the newcomer. It should not, however, be inferred that we shall confine ourselves to the ABC's of ham radio. We visualize *CQ* as a magazine that will stick with the ham long after the parts of his first rig are dust-laden in the junk box, and as a monthly refresher course for the old timer. While placing some emphasis on the elementary, we are still under obligation to carry through with articles on modern techniques and apparatus. Similarly, we shall follow up tradition (with which every true ham must be familiar) with all vital news of amateur radio today and tomorrow."

Looking through that first issue, one author stands out. I saw the name McMurdo Silver listed as the author of "Why 100% Modulation." That name conjured up in me memories of deeds and accomplishments, and yet drew some blank looks around here when I mentioned it. While I'm not that old nor yet wizened, Mr. Silver's name is slipping, or has slipped,



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into history. Perhaps someone looking at this issue 50 years hence will never have heard of some of today's giants and think that the amateur radio of their day always was. *CQ* for 50 years has chronicled our history, our striving, and our advances in the greatest hobby that ever was. Most of all, it is a living history of all the people who helped contribute to where we are today, and a monumental list of people who have enjoyed to the fullest what amateur radio has had to offer them at each stage of our history. *CQ* has always attracted the maverick, the free-thinker, the non-conventional innovator who asks, "Why not?" and then goes out and does it. Does it so well, that by virtue of exposure and correspondence, a new product is introduced on the market or a new company is formed. *CQ*, from either day one or day 18, 250, is about possibility and the very enjoyable aspect of having fun while doing what you love.

For 50 years *CQ* has consistently offered the one intangible quality of amateur radio that originally drew me to the hobby. Each editor in turn offered each succeeding generation of amateurs a new or continued series of heroes and legends to look up to and admire. Yes, some did have feet of clay and were a bit quirky, but they all had the power to inspire us to be and do better with our amateur radio lives. Early on in my amateur radio life I used to wonder if Frank Jones, W6AJF, ever slept. It seemed that month after month he would come up with these elaborate and beautiful construction projects. These were during his early days with *CQ* when he was heavily into HF. Later on, when he took up VHF with the same ferocity, the projects didn't quite look as nice, but the volume was astounding. And there was Bill Scherer, W2AEF, whose beautifully written articles never ceased to teach while being always fascinating in their mechanical complexity. He loved his mechanical drawings of intricate brackets and sub-assemblies (and so did I).

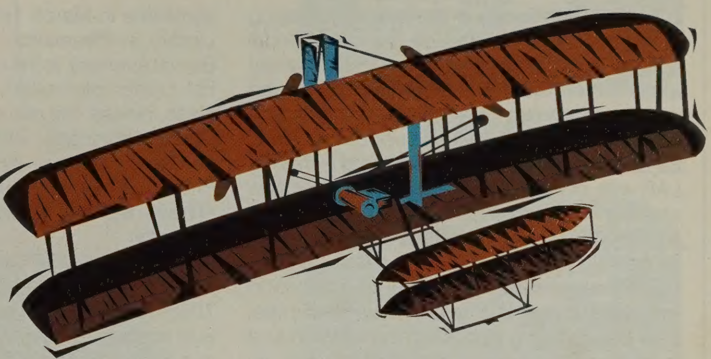
When you consider all of the firsts in technology that *CQ* has published, it isn't too hard to understand why we have been in existence for 50 years. *CQ* has always fostered new ideas and provided a homebase for creative people who each editor felt were heroes in some respect. If you put that much talent together, you're bound to come up with lots of good ideas that motivate other people.

For 19 years in this position I've been very fortunate to work with most of my heroes and foster a few new ones. Sometimes I feel like the winning football coach, who little by little has managed to put together the "Dream Team" of players. In some ways, this may be a good analogy in that one can analyze, create strategy, theorize, and dissect all of the various elements of the game of football. However, it is the players who are the stars and make the game exciting. Without them it's simply an intellectual exercise.

I hope that you, for as many of the 50 years as you've been around, have found and enjoyed that spark of excitement that we have. I hope that you have heroes, too. They don't always have to be bigger than life. They simply *are* life.

73, Alan, K2EEK

"The World is Flat"



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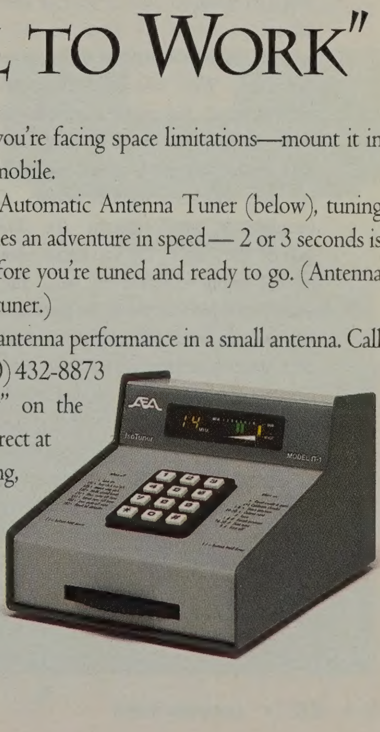

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ANNOUNCEMENTS

•The STELAR Group is interested in bringing together "prime movers" on the international amateur radio educational scene to exchange ideas and consider the feasibility of forming an international group. The STELAR Group is affiliated with the RSGB, which supports its aims. So far over 120 schools are affiliated with STELAR with over half of these having their own amateur radio stations. ICARE (International Conference on Amateur Radio Education) will be held July 12–15, 1995. It is envisaged that representatives from groups all over the world with aims similar to that of STELAR will meet near London for a brainstorming session and to compare notes and experiences. For an information packet write to the conference organizer, Hilary Claytonsmith, G4JKS, 115 Marshalswick Lane, St. Albans, Herts, AL1 4UU (phone: 01727 859318).

•Theory Class for Novice and Technician licenses—An amateur radio code and theory class for Novice and Technician licenses will be held Tuesday or Wednesday evenings beginning November 2, 1994. Students are welcome to join the class after it is "in progress." Sponsored by the Livermore Amateur Radio Klub (LARK) and the Pleasanton Library. When: Every week on Tuesday or Wednesday, 7–9pm, beginning November 2, and continuing November 9, 15, 22, 29. Dates of future classes will be announced. Class end will be sometime in March 1995. Where: Pleasanton Library in Pleasanton, California (located on Bernal Avenue), in the large Community Room. For further information and to sign up for the class, please call one of the following people: Chuck Thompson, KE6DRN (510-606-6074); or Clancy Soucie, N6FQQ (510-462-8946); Packet via: @Wa6YHJ-1.#NOCAL.CA.USA.

•These Special Events are scheduled for January:

NorthWest QRP Club Winter Sprint - January 14, from 1800–2259 UTC on 3560–3580, 7035–7040, 14060 kHz. The object of the sprint is to contact as many QRPers aspossible within a 5 hour period. QSOs with NW QRP Club members count 5 points, non-members count 3 points. QSOs with non-QRP stations count for one point. Exchange: RST, state (province/cCountry), NWQ mMember # or power level if non-member. Multipliers: Multiply total score by 3 for using 1 watt or less. Awards will be given to the top over-all score, the top score in each US call area, and the top DX score. Return entries by March 20, 1995 to Stan Yarema, KG7ME, NW QRP Club Contest Editor, 3457 12th West, Seattle, WA 98119.

WA1WTR, KE4PDI, from Sunrise, Florida; The Sunrise Tech Amateur Radio Team; to commemorate their 5th anniversary; from 1500Z to 2100Z, Jan. 22 in the lower 50 kHz of the 20 meter General phone subband. For certificate, send QSL and a 9 × 12 SASE to Sunrise Tech, 10001 NW 50th St., Suite 110, Sunrise, FL 33351.

N7RPC, from Evanston, Wyoming; The Uinta County ARC; to celebrate the Chinese New Year; Jan. 28–29; 1500Z to 2400Z. For certificate, send QSL, contact #, and 9 × 12 SASE to Clarence Vranish, N7RPC, P.O. Box 2048, Evanston, WY 82931-2048.

KG8KL, from Yankee Springs, Michigan; The Barry County ARES Team, a division of the Barry Communications Network (BACON), in conjunction with the 14th Gun Lake WinterFest; Jan. 28; 1300Z to 1800Z; in the General portions of the 80, 40, and 20 meter bands and, if conditions permit, 15 meters. Novice CW portion of the 80 and 40 meter bands and Novice voice portion of the 10 meter band will also operate if conditions permit. For certificate send QSL and #10 envelope and return postage to either N8ZSG, 89 Woodstrail, Delton, MI 49046, or KG8KL, 118 S. Hanover, Hastings, MI 49058.

• The following hamfests, etc., are slated for January:

Jan. 7–8, **Ft. Myers Hamfest**, Araba Shrine Temple Hall, Ft. Myers, Florida. Contact Jerry Deutscher, KQ4UW at 813-472-5130; or Dale Hardin, KD4UAO at 813-277-1984. (Exams.)

(Continued on page 234)

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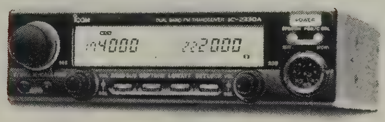
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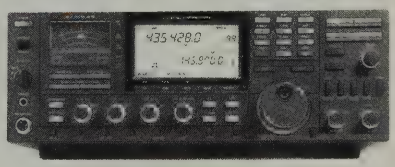
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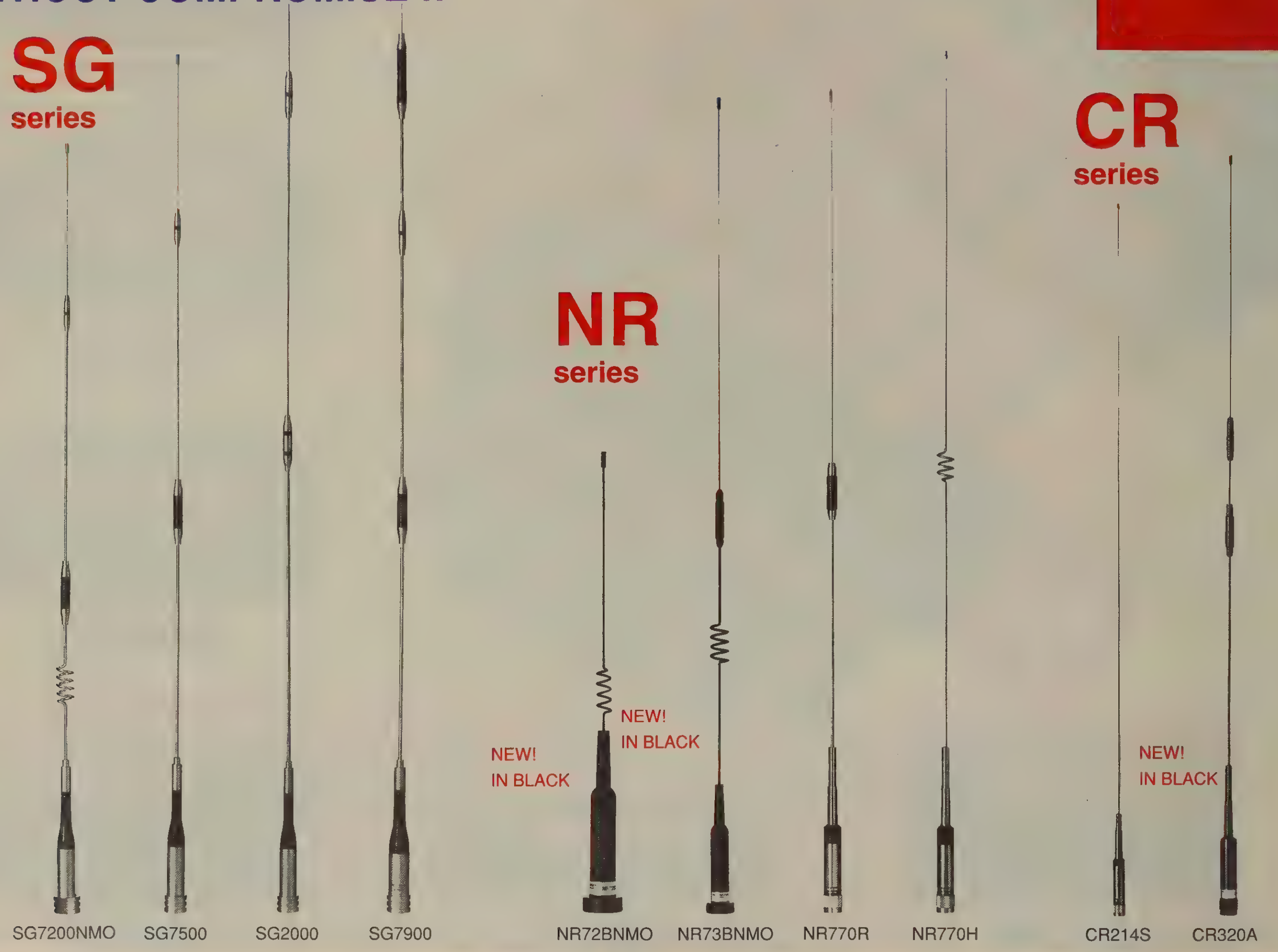

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NR-73BNMO	2m/70cm	2.15/5.3	100	NMO	33.5	1/2 λ ,2-5/8 λ
NR-770SA	2m/70cm	2.15/2.15	100	UHF	16.9	1/4 λ ,1/2 λ
NR-770HA	2m/70cm	3.0/5.5	200	UHF	40.2	1/2 λ ,2-5/8 λ
NR-770HNMO	2m/70cm	3.0/5.5	200	NMO	38.2	1/2 λ ,2-5/8 λ
NR-770RA	2m/70cm	3.0/5.5	200	UHF	38.6	1/2 λ ,2-5/8 λ
NR-790A	2m/70cm	4.5/7.2	120	UHF	57.5	6/8 λ ,3-5/8 λ
SG-7000	2m/70cm	2.15/3.8	100	UHF	18.5	1/4 λ ,6/8 λ
SG-7200NMO	2m/70cm	3.2/5.7	150	NMO	36.6	1/2 λ ,2-5/8 λ
SG-7500A	2m/70cm	3.5/6.0	150	UHF	40.6	1/2 λ ,2-5/8 λ

MODEL	BAND	GAIN(dBd)	POWER (w)	MOUNT	HT (IN)	ELEMENT PHASING
SG-7900	2m/70cm	5.0/7.6	150	UHF	62.2	7/8 λ ,3-5/8 λ
SG-2000	2m	5.2	150	UHF	62.6	7/8 λ
NR-140A	1-1/4m	3.8	100	UHF	36.2	5/8 λ
NR-124	23cm	8.4	100	N	25	4-5/8 λ
CR-214S	2m/1-1/4m	2.15/3.4	120	UHF	37	1/2 λ ,5/8 λ
CR-224A	2m/1-1/4m	5.0/6.0	150	UHF	68.5	7/8 λ ,2-5/8 λ
CR-320A	2m/1-1/4m/70cm	2.15/3.8/5.5	200/200/100	UHF	37.4	1/4 λ ,1/2 λ ,2-5/8 λ
NR-2000NA	2m/70cm/23cm	3.15/6.3/9.7	100	N	39	1/2 λ ,2-5/8 λ ,5-5/8 λ

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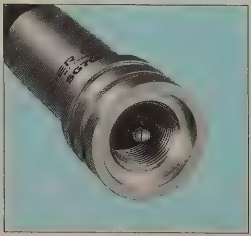
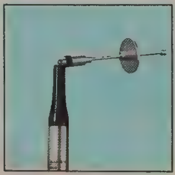


FOLD-OVER

PATENTED ONE-TOUCH FOLD-OVER FEATURE



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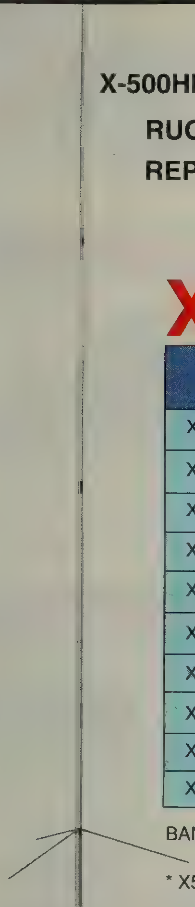
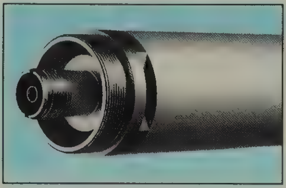
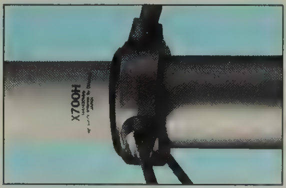

X510

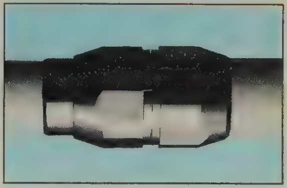
X-500HNA

**RUGGEDIZED BASE/
REPEATER ANTENNA**


COAX CONNECTION AT BASE END



HEAVY DUTY BASE/ RADIAL ASSEMBLY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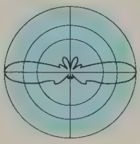
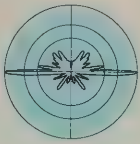
X series

MODEL	BAND(MHz)	GAIN(dBd.)	WATTS	CONN.	HT. Ft.	RATED WIND/ MPH
X-50A	144/440	4.5/7.2	200	UHF	5.6	135
X-200A	144/440	6.0/8.0	200	UHF	8.3	112
X-300A	144/440	6.5/9.0	200	UHF	10.2	112
X-510NA	144/440	8.3/11.7	200	N	17.2	90
X-510MA	144/440	8.3/11.7	200	UHF	17.0	90
X-500HNA	144/440	8.3/11.7	200	N	17.8	90+
X-700HA	144/440	9.3/13.0	200	UHF	24.0	90
X-2200A	144/222	6.0/7.8	150	UHF	11.5	112
X-3200A	144/222/440	6.0/7.8/8:0	100/200	N	10.5	112
X-6000A	144/440/1240	6.5/9.0/10.0	100/100/60	N	10.5	112

BAND: 144=144 - 148MHz. 222=222 - 225MHz. 420=420 - 430MHz.
430=430 - 440MHz. 440=440 - 450MHz. 1240=1240 - 1300MHz.
* X510NJ :144 - 147 / 430 -440MHz


147MHz

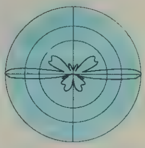

445MHz

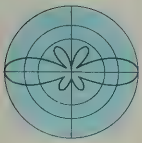
RADIATION PATTERNS FOR X-500HNA/X-500MA/X-510NA

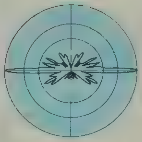
GH/F/U&V series

MODEL	BAND(MHz)	GAIN(dBd.)	WATTS	CON N.	HT. Ft.	RATED WIND/ MPH
DP-GH62	50	6.0	200	UHF	21.0	78
F-22A	144	6.7	200	UHF	10.5	112
F-23A	144	7.8	200	UHF	15.0	90
F-142A	222	5.5	200	UHF	6.0	110
F-718A*	440	11.5	250	N	15.0	110
F-1230A	1240	13.5	100	N	10.5	90
U-200A	440/1240	8.3/11.7	100	N	5.9	135
U-300A	440/1240	8.6/13.2	100	N	8.3	110
U-5000A	144/440/1240	4.5/8.3/11.7	100	N	5.9	135
V-2000A	50/144/440	2.1/6.2/8.4	150	UHF	8.3	110

*F-718A:440 - 450MHz, F-718J:430 - 440MHz, F-718L:420 - 430MHz

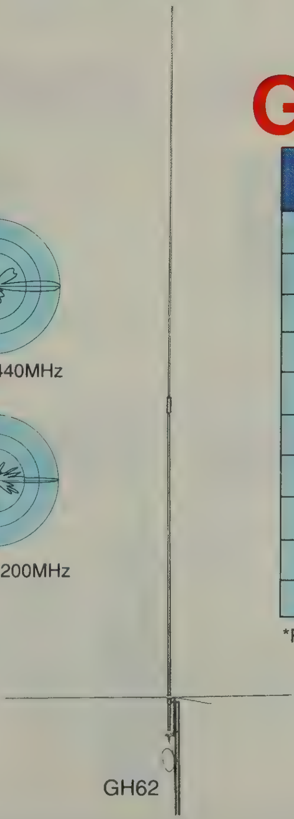

U-300A 440MHz


F-22


U-300A 1200MHz

F22

U5000


GH62

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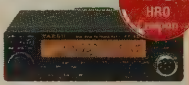

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After 45 years between articles, it's very nice to have W5OLY back on the pages of CQ. His last article, "How To Neutralize Your Single-Ended Tetrode Final," became a classic, and its principles were used by just about all amplifier manufacturers. This time around we learn where all the reflected power goes and why.

Reflected Power Stays In The Coax

BY WARREN B. BRUENE*, W5OLY

The purpose of this article is to help the reader get a better picture of how RF travels down the coax—especially with a mismatched termination.

Nearly all amateurs use an RF transmission line to couple the RF power generated by their RF power amplifier out to their antenna. Most of us have used SWR meters or directional wattmeters to measure how well our antenna matches the Z_0 of the transmission line feeder. Perhaps you have wondered just what happens to reflected power. Does it get back into the RF power amplifier? Is it dissipated anywhere? Please read on for a fresh view of RF behavior in a coax transmission line.

Real Power

Fig.1 illustrates an ideal case where a lossless 50 ohm coax is terminated in a 50 ohm resistive load. The equivalent generator circuit connected to the coax represents an RF signal generator (a piece of test equipment for making measurements in a laboratory). Signal generators have a 50 ohm output resistance, R_S, which is the resistance looking back into the generator. This equivalent circuit is only useful for determining the behavior of the generator at its *output* terminals. It cannot be used to determine other parameters of the generator such as efficiency, for example. It is very useful for determining how the generator output voltage and current vary as the generator load impedance varies.

Either of two kinds of equivalent generator circuits can be used. Their behavior as observed at their output terminals is identical. The first is the **Thevenin** equivalent circuit shown connected to the coax. The other, shown to the left, is the **Norton** equivalent circuit, which employs a current source and a shunt resistor. This shunt resistor has the same value of resistance ($R_S = 50$ in our example) as the Thevenin circuit.

Referring to fig.1 again, the RF generator applies an RF voltage across the coax input terminals, and an RF voltage wave travels down the coax. The diagram below the coax illustrates the sine wave voltage at one instant by the heavy line and where it was at two instants earlier by the lighter lines.

A current wave also travels down the coax, and it is always in phase with the voltage wave. The load is 50 ohms, so all of the RF power is absorbed by the load. None is reflected. Therefore, all of the RF power transmitted down the transmission line is REAL POWER. It can be computed as follows:

$$P = V*I = V^2/50 = I^2*50$$

where V and I are rms values

Note 1. The symbol * is used to designate multiplication.

Note 2. Lossless coax and reactive elements are used for simplicity.

Reflected Power

Fig. 2 illustrates a case where the load resistance is 150 ohms. In this case the voltage and current waves are not all absorbed by the load. Part of each is reflected. Since R_L is greater than

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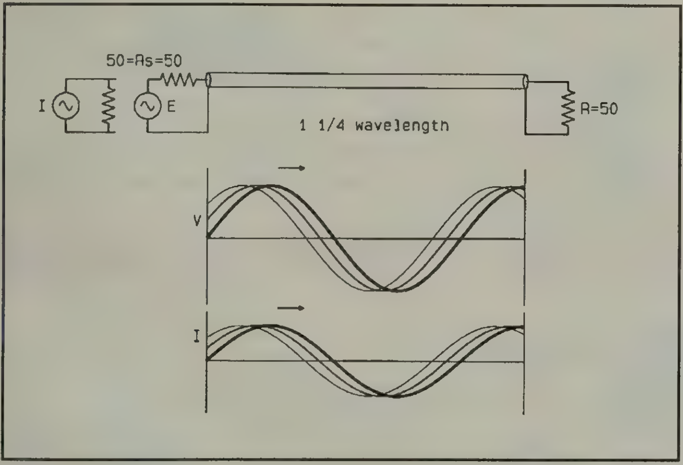

Fig. 1– Voltage and current waves shown here traveling towards a matched load.

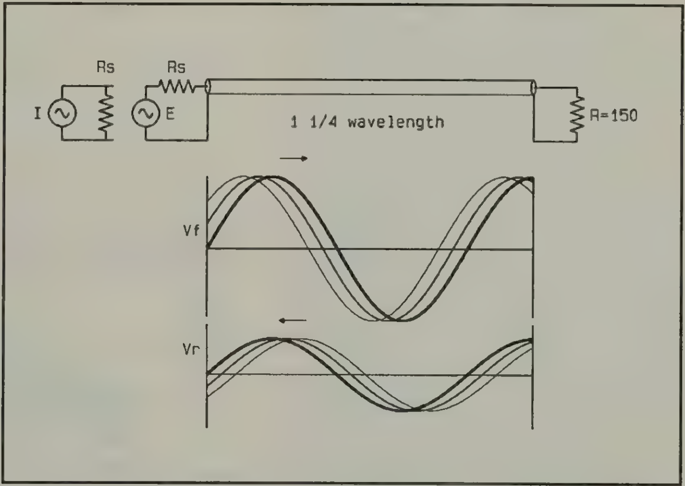

Fig. 2– Forward and reflected voltages traveling in the coax.

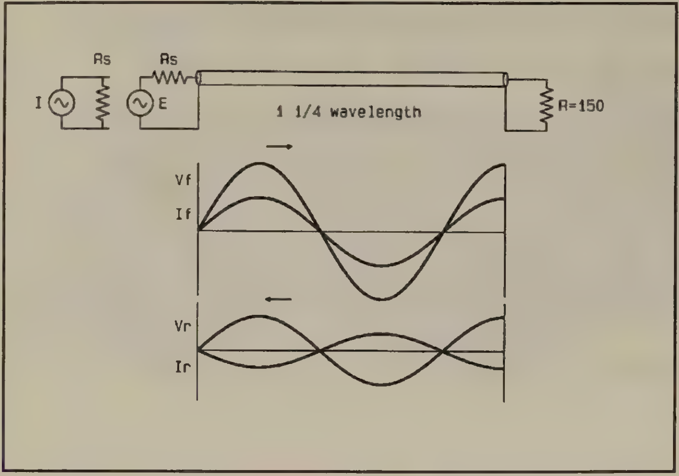

Fig. 3– Forward voltage and forward current upper, and reflected voltage and reflected current lower.

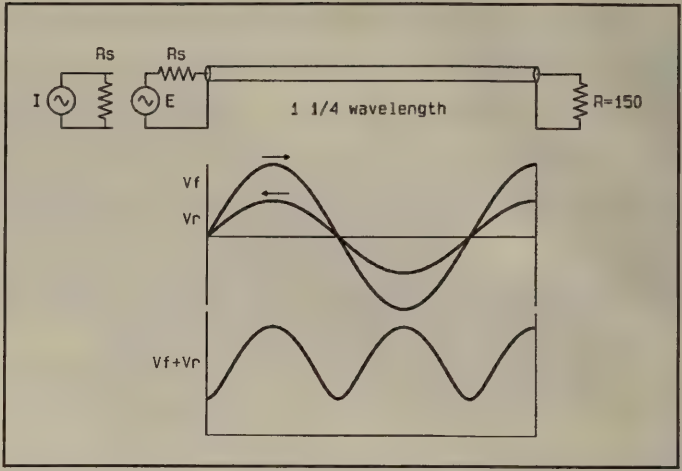

Fig. 4– Forward and reflected voltage traveling waves and the standing wave they produce. (Note: Absolute magnitude of $V_f + V_r$ phasor sum is plotted.)

50 ohms, the reflected voltage is in phase with the forward voltage. It would have been out of phase if R_L had been less than 50 ohms. However, **the reflected current is always out of phase with the reflected voltage**, as illustrated in fig. 3.

The ratio of reflected voltage to forward voltage, V_R/V_F, is called the **reflection coefficient rho, p**.

$p = (Z_L - Z_0)/(Z_L + Z_0) = (150 - 50)/(150 + 50) = 1/2 = V_R/V_F$

The reflected waves travel back to the input end of the coax, where they are reflected again. The reflected wave is re-reflected by the the input VOLTAGE—not R_S. The re-reflected current is now in phase with the re-reflected voltage. The re-reflected power travels back toward the load just like real power. There is no way to tell them apart and the sum is called FORWARD POWER. The reflected power, therefore, just continuously travels (circulates) back and forth in the coax. **The reflected power stays in the coax** (when signal level is constant). It just becomes part of the forward power when it is travelling toward the load.

$P_R/P_F = (V_R/V_F)^2 = (1/2)^2 = 1/4$ in example

When the generator is turned OFF, by reducing the equivalent generator voltage to zero instantly, but leaving the R_S of 50 ohms, all reflected power will be dissipated in R_S on its first trip back. If the generator is turned OFF by open circuiting the generator, all reflected power will be re-reflected at the input end of the coax. Part of it will pass to the load like real power, so it will be dissipated into the load in a few round trips. This will happen within a few microseconds, so the energy in the reflected power, which is circulating in the coax, is very small. If R_S is other than 50 ohms, then part of this energy will be dissipated in the generator and part in the load. The amount of energy is so small that it need be of no concern.

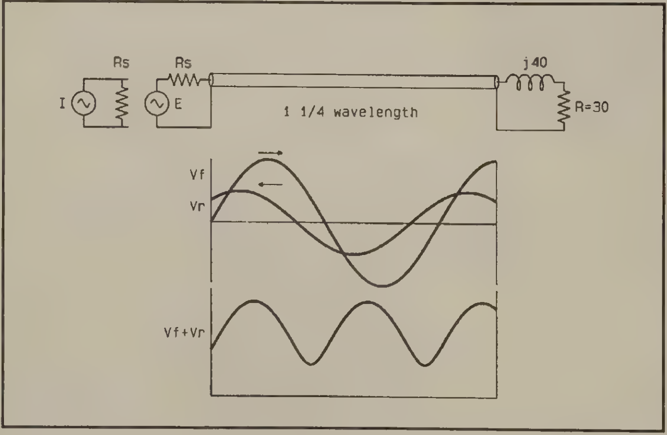

Fig. 5– Forward and reflected voltage traveling waves and the standing wave they produce with a reactive load.

Standing Waves

The forward and reflected voltage waves travelling in opposite directions (at nearly the speed of light) set up an interference pattern called a **standing wave** (see fig. 4). The places along the coax where both waves are in phase when they pass are called a **voltage maximum**. The places where they are out of phase as they pass are called a **voltage minimum**. If you tapped an oscilloscope across the coax at a voltage maximum, you would see a sine wave the amplitude of which is:

$V_{max} = V_F + V_R$

If you tapped the line at a voltage minimum, you would see a sine wave with an amplitude of:

$V_{MIN} = V_F + V_R$

The voltage maximums are spaced only a half wavelength apart, because the relative velocity of each wave to each other is twice that of the velocity of each to a fixed point along the coax.

The I_F and I_R waves produce a standing wave also. The current maximums are located midway between voltage maximums, but the current minimums are located at the same points as the voltage maximums.

The SWR can be computed as follows:

$SWR = (1 + p)/(1 - p)$

Reactive Loads

Fig. 5 shows a case where the load Z = 30 + j40 ohms.

$$\begin{aligned} p &= (30 + j40 - 50)/(30 + j40 + 50) \\ &= (-20 + j40)/(80 + j40) \\ &= 0.500 \text{ at an angle of 90 deg.} \end{aligned}$$

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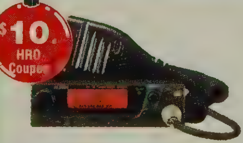

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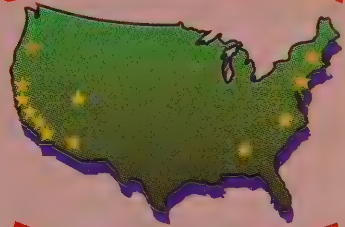

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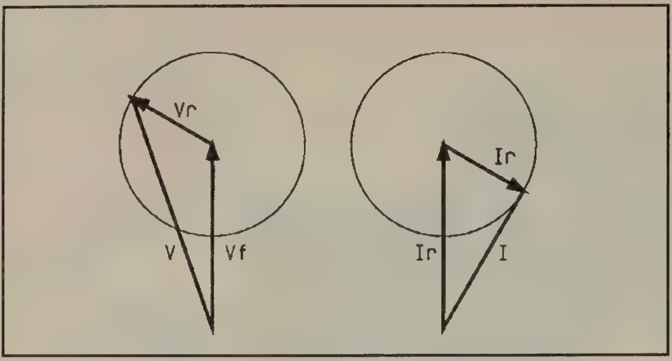

Fig. 6– Voltage and current phasor relationships. (Current scale is Z_0, or 50 times the voltage scale, which makes the forward and reflected components equal.)

Half of the angle of 90 degrees is the distance from the end of the coax back to the first voltage node.

SWR = (1 + 0.5)/(1 – 0.5) = 3

Voltage and Current Phasors

Fig. 6 illustrates the phasor relationships between the forward and reflected voltages and currents. All phasors are shown relative to the phase of the forward phasor at any given point along the coax. **I_R is always 180 degrees out of phase with V_R.** The V and I phasors represent the relative magnitude and phase relationship between V and I. The scale for current is Z_0, or 50 times the voltage scale. For example, 50 volts and 1 ampere would be shown with equal lengths. The reflected phasors V_R and I_R rotate clockwise as the location is moved toward the input end of the coax.

The coax load impedance determines the relative length of the reflected voltage to the forward voltage, and also the phase angle of the reflected voltage to the forward voltage.

Directional Wattmeter Operation

Fig. 6 also illustrates how directional wattmeters operate.[1] They obtain two voltage samples. One represents the voltage V across the line, and the other represents the line current I. They are adjusted to be of equal amplitude when the coax is terminated in 50 ohms (so there are no reflected waves). The samples are added to measure forward power. The forward components are in phase so they add, but the reflected components are out of phase with each other so they cancel. This leaves just the two forward components which are used to drive a meter movement. Power is proportional to voltage squared. The meter scale can be calibrated to perform this squaring so that the pointer will indicate forward power in watts. Subtracting the two samples cancels the forward components but leaves the sum of the reflected components. This sum is used to drive the same meter to indicate reflected power.

We can compute real power by subtracting reflected power from forward power. We can determine SWR either by referring to a chart or by using the following equation:

$$SWR = (1 + (P_R/P_F)^{1/2})/(1 - (P_R/P_F)^{1/2})$$

Newer digital directional wattmeters apply the two voltage samples to electronic circuitry, which may use the following equation:

$$SWR = (1 + V_R/V_F)/(1 - V_R/V_F)$$

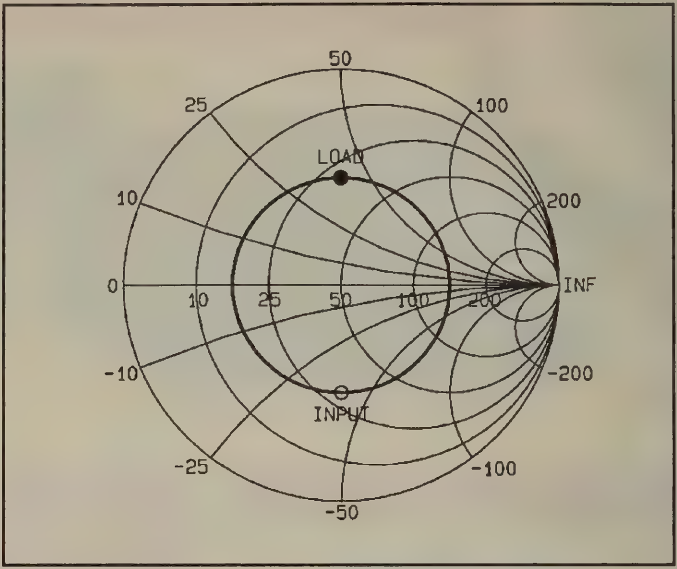

Fig. 7– Coax load and input impedances in example.

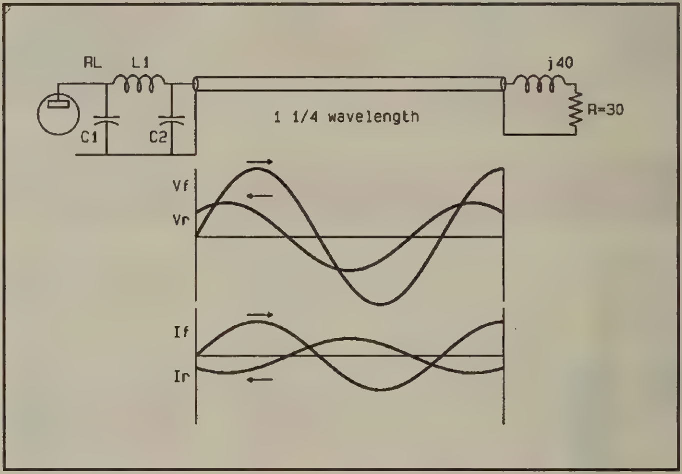

Fig. 8– Tuned pi-network feeding coax with SWR.

Likewise, electronic circuitry is used to square V_F or V_R and display either forward or reflected power. Additional circuitry subtracts reflected power from forward power to display the real power being delivered to the load.

Coax Input Impedance

The coax input impedance depends upon the coax length as well as the load impedance (except for the case when $Z_L = Z_0$). If the coax length were gradually varied in length by one-half wavelength, the input impedance would trace a circle when plotted on an impedance chart. This is called an SWR circle. A Smith Chart[2] is more useful for determining coax input impedance because all SWR circles are centered on Z_0, or 50 ohms in our examples. Furthermore, the degrees rotation around the SWR circle is twice the electrical length of the coax. Therefore, to determine the coax input impedance we just locate the load impedance on the Smith Chart, rotate that point **clockwise** by twice the electrical line length in degrees, and read the input impedance at that point. This is illustrated in fig. 7.

A still easier and more accurate way is to use a computer program to compute the input impedance. It probably would include the effect of line loss also.

Real and Reactive Power in Transmitter Output Network

Fig. 8 illustrates a simple tuned pi-network coupling a power amplifier tube to the coax transmission line. The pi-network load impedance is the same as the coax input impedance, which is 30 – j40 in this example. The equivalent PARALLEL resistance and reactance of the pi-network load is 83.333 and –j62.5 ohms, respectively. The values shown were computed for the following operating parameters:

R_L = 2000 ohms plate load resistance
R_S = 10000 ohms equivalent output source resistance at tube plate
Q = 10 which is the ratio R_L/X_{C1}
Z_{IN} = 30 – j40 coax input impedance

P = 1500 watts real power delivered to the load
P_F = 2000 watts forward power
P_R = 500 watts reflected power
VAR in C_1 = 15,000 volt-amperes reactive
VAR in C_2 = 687
VAR = 2,000 required to interface with coax Z_{IN}
Total = 17,687 total capacitive VAR

VAR in L_1 = 17,687 total inductive VAR

Only reactive current flows through C_1 and C_2. Both real and reactive current flows through L_1, however. The real part is the fundamental component of the plate current pulses generated by the tube. The reactive part is the same as the current passing through C_1 (less the harmonics in the plate current pulses). The current delivered to the coax is the total current in L_1 minus the reactive current in C_2.

If the pi-network load impedance had been a pure resistance, the amount of reactive power VAR circulating in L_1 would equal the sum of the VARs in C_1 and C_2. When the load impedance has a reactive component, the reactive power in C_2 will be more or less by the reactive power required to interface with the coax.

Reactive current is +/–90 degrees out of phase with real current and real voltage. Therefore, only real and reactive voltages and currents exist in lumped constant circuits (such as the pi-network), and only forward and reflected power exist in a coax transmission line. The power changes from one to the other at each interface between a lumped constant network and a coax.

The value of R_S is not important in a tuned amplifier and does not influence any of the calculations.

Fixed Tuned Power Amplifier Output Network

Solid-state power amplifiers typically use transformers for impedance transformation (from 50 ohms to the transistors) and a low-pass filter to attenuate harmonics. In this case, any SWR on the coax will cause the transistor load impedance to depart from the design value because the "SWR" will pass through an untuned network or filter. The transistor load impedance will be somewhere around an SWR circle, as illustrated in fig. 7, but centered on the transistor design load resistance. That is why these amplifiers back down their drive when SWR is greater than approximately 1.5 to 1. This is necessary to avoid exceeding a current, voltage, or dissipation limit. Reflected power does not get back into the power amplifier, but it does change the transistor load impedance. The amount of power output change with this load impedance change depends upon the transistor amplifier **output source impedance**. It may have a substantial reactive component in addition to the resistive component R_S. This depends greatly upon the transistors selected, the circuit design, feedback inherent or added, and partial neutralization.

Some of the newer solid-state amplifiers include an automatic tuner to keep the transistors operating into their optimum load resistance (like tube transmitters with tuned output networks).

Interface Between Lines of Different Z_0

You may wonder what happens to reflected power at the interface of two transmission lines having different Z_0s. There is some value of r + jx at the interface. Each transmission line will have its own forward and reflected waves. The reflected power circulating in each line stays separate from the other. The same is true for a tuning stub shunted across a transmission line.

Conclusion

Reflected power circulates back and forth in the coax (or other transmission line) much like reactive power circulates in a resonant circuit. The energy in each "rings down" when the signal level lowers or is keyed OFF. Reflected power does change the input impedance of a transmission line, and this impedance change can pass through an untuned output network or filter. Only real and reactive currents flow in L/C networks.

Footnotes

1. W. B. Bruene, "An Inside Picture of Directional Wattmeters," *QST*, April 1959.
2. Phillip H. Smith, *Electronic Applications of The Smith Chart*, for Kay Electric Co., McGraw Hill 1969. ■

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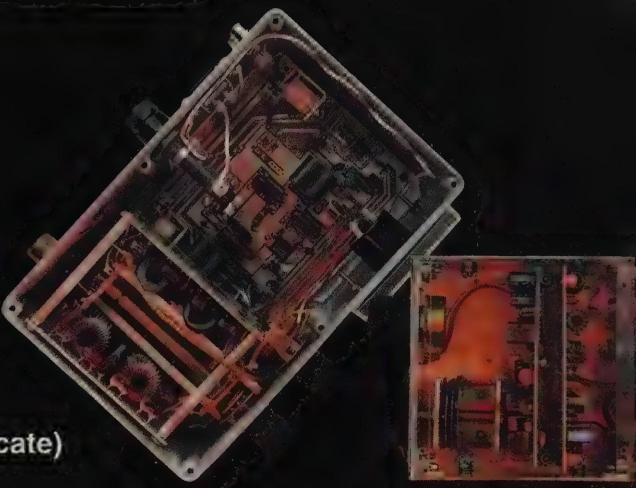

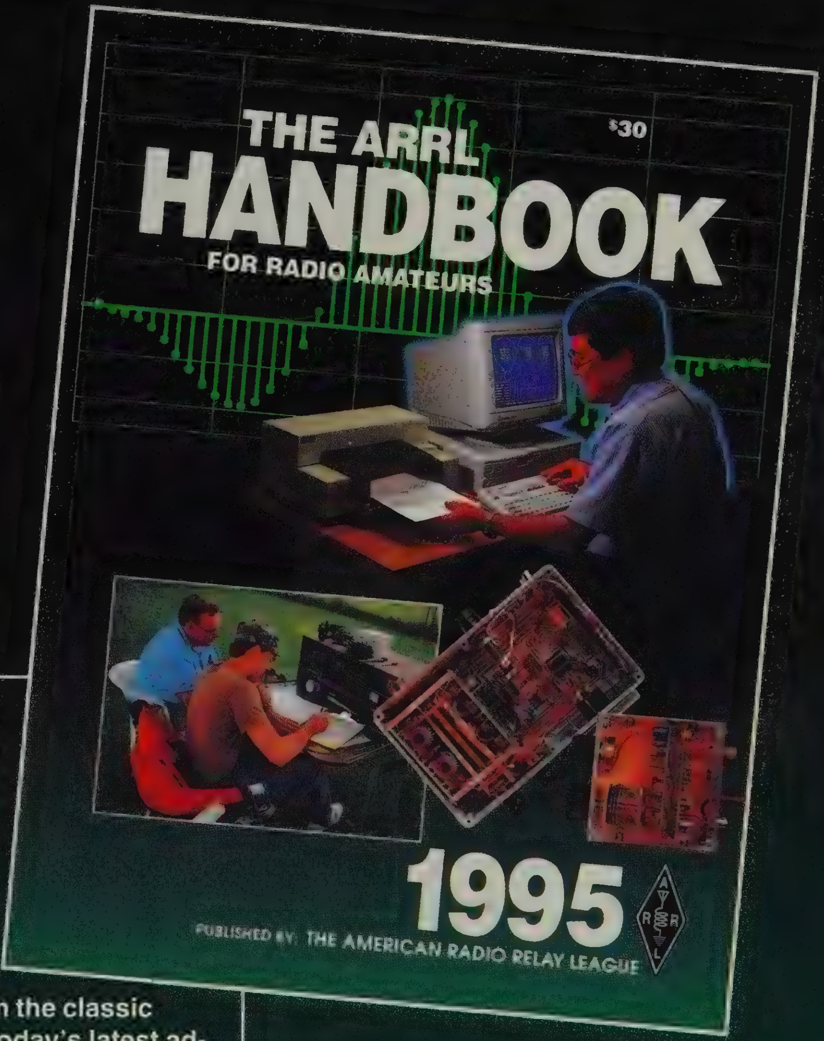

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CQ REVIEWS:

The PAR Electronics VHFDN152 2 Meter Notch Filter

BY ED JUGE*, W5TOO

Following my November 1993 review of the SincLabs SBP144-4 two meter cavity-type bandpass filter, many people responded positively, but wished for a more economical intermod solution.

There are a couple of ways to approach the intermod problem; each has plusses and minuses. The previously reviewed product was a cavity-type bandpass filter. It effectively blocks signals that do not fall within its bandpass range. The advantage is it can block interference over a wide spectrum of frequencies outside the operating range. Even though cavities are very possibly the most effective solution, the disadvantages are size and perhaps, most important, cost (usually several hundred dollars).

The second option is a notch filter. The folks at PAR Engineering found that most intermod affecting 2 meters comes from strong commercial services in the 152–153 MHz region. According to PAR, paging services assigned in this range are the primary offenders. Therefore, they designed this filter to provide attenuation in excess of 40 dB with an insertion loss of only 0.1 dB in the 2 meter band. Claimed SWR is less than 1.15:1.

In addition to affordability, this type of filter has other very appealing features. Because it blocks only a specific frequency area, you can continue to monitor most non-amateur frequencies your radio may be designed to hear. It won't block aircraft, weather, and other popular frequencies.

Another nice thing about the PAR filter is its size. It fits into even the tightest installation. In my Ford Explorer, I tucked it behind a loose flap of carpet under the dash. And finally, you can transmit through the PAR filter—no switching to worry about.

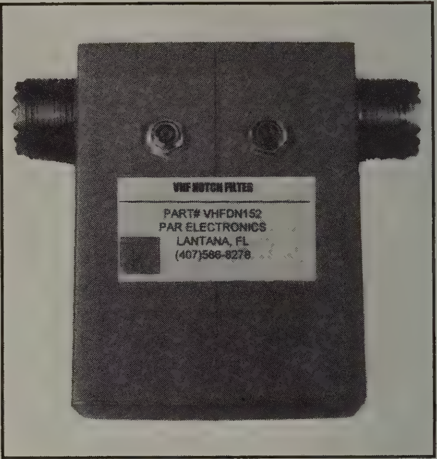
The disadvantage is should your interference be coming from some other part of the spectrum—outside the design stop band—the filter will be no help at all.

Just so you'll have a point of reference to go with the conclusions, let's back up a minute and restate our local problem. Here in Fort Worth, Texas the downtown intermod jungle often prevents even the best 2 meter amateur radios from hearing some local repeaters. Many days the squealing and squalling downtown extends several miles in some directions outside that area.

I have traveled to many cities and my home town is one of the worst two or three I've seen.

In recent years amateurs have demanded receivers that hear everything from aircraft to 800 MHz public service. I'm sure they're useful in some areas, though I have yet to see the 2 meter HT that could hold a candle to a good handheld scanner for frequencies outside the 2 meter band.

If you live in an intermod-infested area, the last thing you want to do is cripple your ability to work the amateur bands in order to gain a mediocre scanner. Especially if you like to work simplex, features such as broad front ends and dual-in-band receive can become red flags



The PAR Electronics notch filter is small, simple, and easy to use. It is preset at the factory, so resist the temptation to tweak the exposed trimmers.

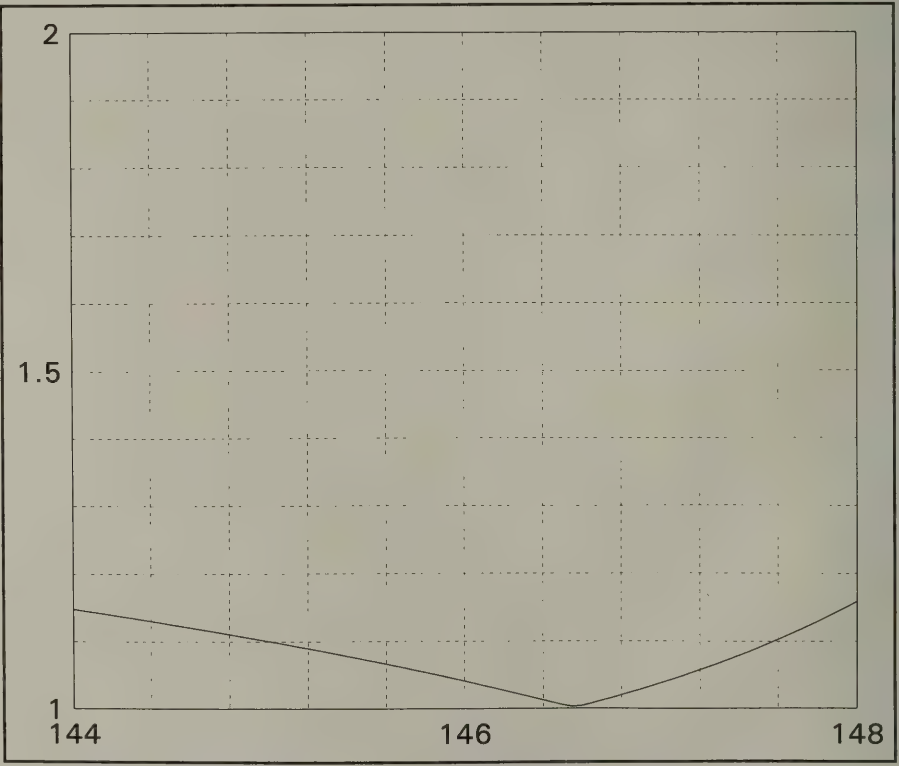


Fig. 1– Insertion loss characteristics of the PAR Electronics notch filter.

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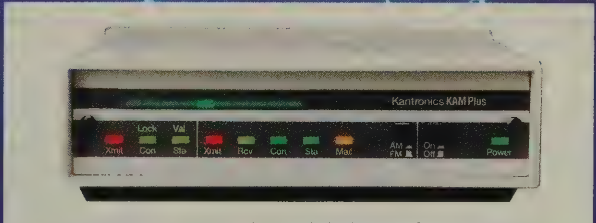

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KAM Plus with G-TOR. Together, the two are taking HF digital communications by storm.

Kantronics

For more information, contact your authorized Kantronics dealer or Kantronics at 1202 E. 23rd St., Lawrence, KS 66046-5006 913-842-7745 FAX 913-842-2021.

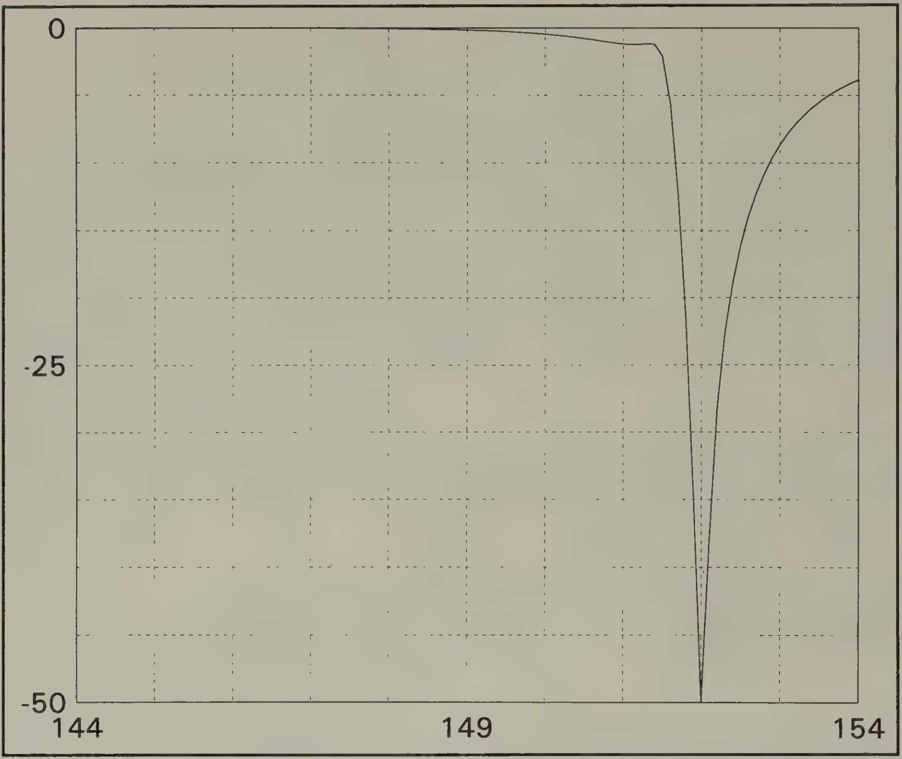


Fig. 2– Attenuation figures for the notch filter showing in excess of 40 dB attenuation in adjacent commercial frequencies which typically cause most intermod problems.

warning "Don't buy me!" That's why to those of us in these unfortunate areas a good filter is such a blessing.

A separate filter may be the best option you buy for your radio. It's a one-time purchase. (How many of our toys can we say *that* about?) It will continue to work on whatever radios you may buy in the future. You can buy the radio you want with the features you prefer and not have to worry too much about how tight the front end is. And, you won't be paying more for each radio because they contain out-of-the-ordinary filter circuits.

How well does the PAR filter work? I must admit, after having tried other similarly packaged and priced filters, I didn't exactly have high hopes.

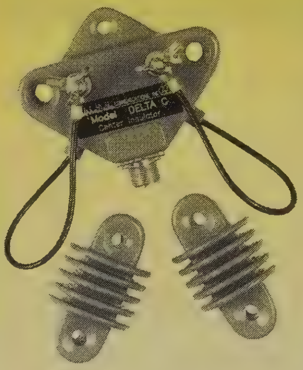
It was Saturday when I finally installed it and drove through town. Intermod is usually at its lowest on the weekend, so it wasn't too exciting when the receiver was quiet. When I went back on a weekday—surprise! No intermod! I stopped, disconnected the filter, and there they were—our local paging services shrieking away in all their glory.

The PAR filter has now been in two different vehicles over a period of several months. The first time or two I headed into the areas known to be the absolute worst for intermod I expected to hear a few blips at least. Nothing. When I stopped in the middle of those areas and keyed up the 146.84 repeater—normally the worst frequency—it was perfectly copyable. I could hear a little "squeaking around the edges" of the signal, but it was minor. ("Squeaking around the edges" is not quite a lab measurement, but it'll have to do since this is a user evaluation, not a lab report.)

Does this mean the PAR filter is "on a par with" a several-hundred-buck cavity? Not at all. But what it does mean is if your intermod is coming from stations in the "band stop" area of this filter, it may be just as good, and it will save you some significant dollars.

PAR Electronics designs, manufactures, and sells a full line of CATV and MATV filters. According to PAR's Dale Parfitt, local amateurs asked them to design a filter for the considerable intermod found in the Miami/Ft. Lauderdale area. A number of designs were tried. The company settled on their asymmetrical notch design. "What makes the filter unusual," says Parfitt, "is its relative simplicity and yet extremely fast rolloff above 151 MHz. We couldn't achieve these characteristics with any of the other designs tried."

At least for the very bad Fort Worth, Texas area, I can tell you the PAR filter seems to work as well as the much more expensive cavity, costs a lot less, and is much smaller and easier to install in most vehicles. It's manufactured by PAR Electronics, 6869 Bayshore Drive, Lantana, Florida (407-586-8278). The model number is VHFDN144 and the suggested retail price is $56. ■



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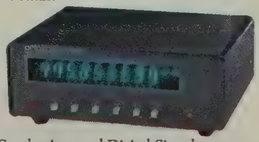

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The name Niuatoputapu doesn't trip off the tongue lightly, but if you're an island hunter, you can learn to pronounce it rather quickly when it's a new one.

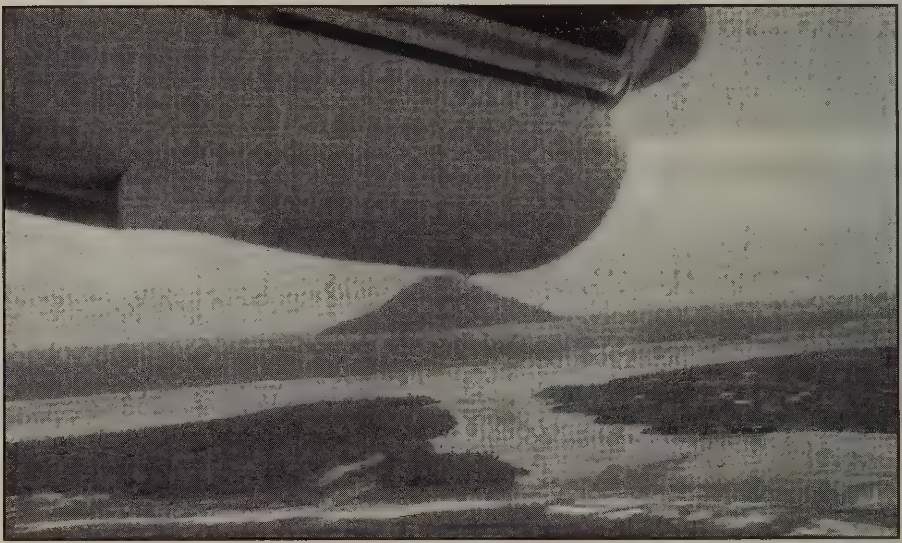
A DXpedition To OC-191 Niuatoputapu Island

BY JIM SMITH*, VK9NS

Over several years I have DXpeditioned to many parts of the world in the name of the DXCC Award program. During the last year or so, since I completed DXCC on CW and SSB, I have become interested in the Islands on the Air Programme (IOTA). It was in the name of IOTA that I recently went to the Kingdom of Tonga. All DXers know that A35, Tonga, is not rare, but in the RSGB IOTA Directory the Kingdom of Tonga has five listings:

1. OC-169—(a) Ha'Apai Group
2. OC-123—(b) Niuafo'ou Island (Tin Can Island)
3. * * * *—(c) Niuatoputapu Island
4. OC-049—(d) Tongatapu Group
5. OC-064—(e) Vava'u Group

It was the "No Number" entry of item 3, which attracted my attention. It had never been active in amateur radio terms, so it was a chance to create a "New One" for Island Hunters.



The "Twin Otter" arrives over Niuatoputapu Island. Tafahi Island is in the background.

I had been speaking to Fr. Kevin, A35KB, on a regular basis. He is a member of HIDXA. I started to talk about Niuatoputapu Island. Kevin is also caught up in IOTA, as he is on Vava'u (OC-064) and is in constant demand. So I started to plan a visit to Niuatoputapu, rather like a DXpedition. Kevin is a Catholic priest and knows Niuatoputapu quite well. It has no electric power; local groups depend on individual small petrol generators. Kevin was sure that the Catholic Mission on the island had a generator, and he said he would check.

Fr. Kevin, A35KB, and Fr. Sione, who met us at the airport.

The Catholic Mission building. My HF6V is visible above the roof. Living quarters were upstairs.

---

* *P.O. Box 90, Norfolk Island, Australia 2899*

Jim, A35MR/P. The rig here is a Kenwood TS-690S. The PS52 power supply ran both rigs.

Sister Loleta talks to Kirsti, VK9NL, via amateur radio. The conditions were very good during the sked.

The island has a population of around 1200. It has a small grass airfield, and there is a flight to and from Vava'u every couple of weeks or so. A small twin- engine "Otter" aircraft carries a few passengers and reportedly has a fairly strict baggage limitation of 22 lbs. plus a carry-on luggage allowance. Since I rarely carry less than 200 lbs. on any normal mini-DXpedition, the idea of carrying a linear was quickly ruled out. It became a matter of the minimum amount of equipment needed for the operation.

The main supplies to the island arrive by sea. A small freighter service visits every few weeks carrying fuel, food, and of course a few inter-island passengers.

In due course Kevin confirmed the availability of a generator, and my permission to visit the island was cleared. The islanders had agreed to sell me 40 gallons of fuel from their precious stock, and things began to look good.

Arrangements with Kevin were then made in several areas. Finally it was decided that with the help of HIDXA, he would accompany me to Niuatoputapu. I really felt that his years of experience in Tonga would be invaluable, and it worked very well. However, plans for our visit in November 1993 were brought abruptly to a halt. The freighter was running three weeks late, and the islanders could not spare any fuel.

The solution was for HIDXA to arrange, via Kevin, for a 50 gallon drum of fuel to be put aboard the freighter at Tongatapu. This fuel actually arrived safely in mid-December, and "J. Smith—NTT" (Niuato-

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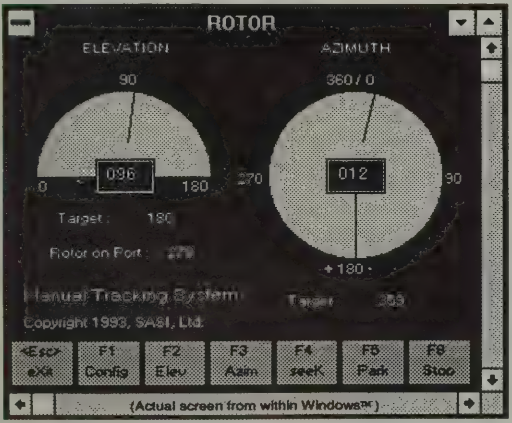

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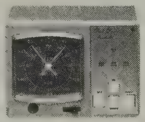

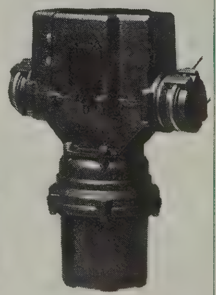

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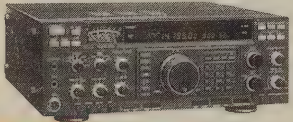

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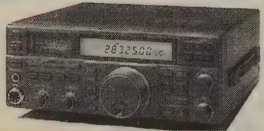

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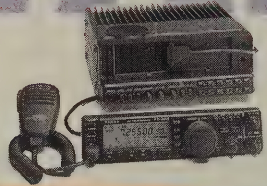

FT-900/AT HF Transceiver • **tx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 100W • 100 memories • built-in antenna tuner • front sub-panel optionally mounts separately from the main body • CTCSS encode with repeater offset • twin stacking VFOS.
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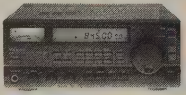

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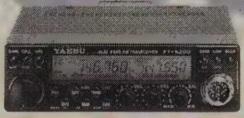

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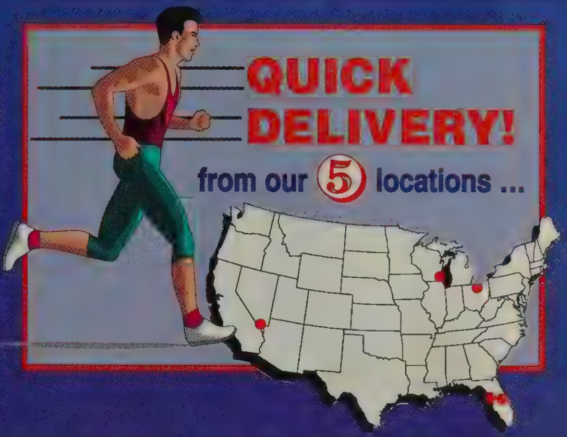

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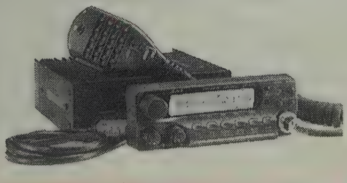

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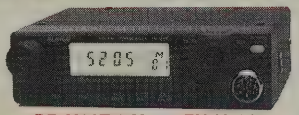

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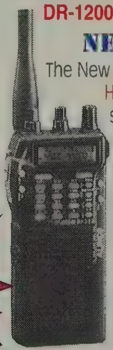
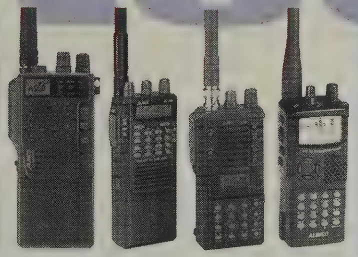


The New **DJ-582T** VHF/UHF FM Handheld Transceiver has the same standard features as the popular DJ-580T, plus: Bigger bold keypad buttons; Easier to grasp control knobs: Faster scan speed; Channels Display; TX LED.

The New **DJ-480T** UHF FM HT features similar design, and offers simple program as found in the DJ-180T.



DJ-180T DJ-580T DJ-F1T DJ-G1T

DJ-180T 2m HT • E-Z to operate! • receives 130-174 MHz • 2.0W, 5W with optional battery. Illuminated LCD display • 16 digit DTMF • 10 memories • 5½"h x 2⅜"w x 1⅜"d.

DJ-180TH • Same as DJ-180T, 5W standard.

DJ-580T 2m/440MHz Twin Band HT • 2.5W • receives 130-174 & 410-470MHz. Modifies for MARS/CAP tx, + 118-136MHz+ • 40 memories • CTCSS encode/decode • DTMF encode • DSQ. • full duplex cross band repeat • scan • autodialer • back-lit keypad • simult. rx on both bands-separate controls • 6½"h x 2¼"w x 1¼"d, 0.97 lbs.

DJ-F1T 2m Mini HT • 2.5W • receives 130-174MHz and 118-136MHz • scanning • autodialer • back lit keypad, 40 memories • call channel • CTCSS • DTMF encode • DSQ paging • 4⁵⁄₁₆"h x 2⅛"w x 1½"d, 14 oz.

DJ-F1T/HP • Same as DJ-1FT but 5W • 12V 600mah nicad battery standard.

DJ-G1T 2m HT • 2m tx/rx + 440MHz and AM aircraft receive • Channel Scope spectrum analyzer • 80 memories -5 for autodialer • Crossband semi-duplex operation • DSQ paging • Scan • 4½"h x1⅞"w x 1½"d, 12.6 oz.

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Three island school boys in their national school uniform.

putapu Island) was painted on the drum! Of course, we did not know this until later.

Kevin, however, was able to find out that the freighter had arrived in December. Now with Christmas and New Years out of the way, by early January I had made airline bookings for me to get to Niuatoputapu. A few days later I also confirmed internal flight bookings for Kevin and myself to Niuatoputapu. There was a last-minute scramble, though, as Kevin could not get final confirmation from the Catholic Mission that the fuel was indeed there, and that the generator was also okay and available for our use. The third telegram to the Mission was finally answered with just two days to spare. It now looked certain that the Island Hunters might soon have a new island to chase.

A couple of days later, on Saturday, I was on my way to Tonga via Auckland, where I had an enforced weekend stopover. Tonga does not allow Sunday flights to the country. However, Monday evening had me in Tongatapu, clearing customs with my radio equipment. Early on Tuesday morning I was on my way to Vava'u. I had to pay extra for excess baggage, but had no problem otherwise.

Kevin met me at the airport, and I was soon settled in at the Catholic Mission. Over the next day or so we checked our resources, since we were due to leave for Niuatoputapu early Friday morning. I had arrived completely self-sufficient—rig, AC power supply, antenna, coax, powerline extension cord, coax cable, and so on. Kevin had very limited equipment, but I brought him a length of coax cable. Neither of his rigs had an AC power supply. Instead he used a rather large battery and small charger as his base station rig supply. He packed his equipment, wire antennas, and his battery charger, convinced that he would be able to borrow a battery from someone on the island.

This was our usual school children audience, this time stopping on the way to school some 1¼ miles away.

Friday morning had us checking in at the airport, once again with few problems with excess baggage. However, Kevin knew everyone and this certainly helped. All those worries over excess baggage were now behind me.

An hour or so later the "Twin Otter" touched down on the grass airstrip on Niuatoputapu Island. We were met by Sione Laina, the Tongan Catholic priest. Incidentally, he was leaving the island on the same plane, but he assured us that everything was okay for our stay. He apologized for the telegram affair, and after seeing him off we were on our way.

All our gear had been loaded on a large truck, and with a bunch of other passengers we set off, dropping people here and there on the way. My first impression of the Catholic Mission was very good, and I soon realized that each of us would have a room to sleep in and that there were shower and toilet facilities. This was much more than I had ever expected.

At ground level there was a large covered area, and it seemed ideal to set up our stations there. In the case of the generator, we were also very lucky. The freighter had brought a new 3KVA generator for the Mission in December, and it had been installed in a small shed about 150 feet away. As a further bonus, the generator output of 230 VAC had been run underground to the Mission building, terminating in a three-pin power socket. Since a fluorescent light had also been installed in the room where we decided to set up our rigs, it seemed as though we were really in business.

Within an hour or so I had my station set up using a Kenwood TS-690S, which is fitted with a built-in antenna tuner. The Butternut HF6V vertical was quickly assembled, and with the radial system in place I was more or less ready to go. My 65 feet of power cable soon had power available near our rigs. I started up the generator, and on 21,260 kHz I informed the gang that we had arrived and would be fully operational soon. ZL2VS was first in the A35MR/P log.

Meanwhile, Kevin was in trouble, as he needed a battery to power his rig. It took some time to locate a battery, but eventually we borrowed one and connected it. This battery business was to be a source of irritation over the next couple of days. Kevin could not stay on the air for more than an hour or so before the battery was

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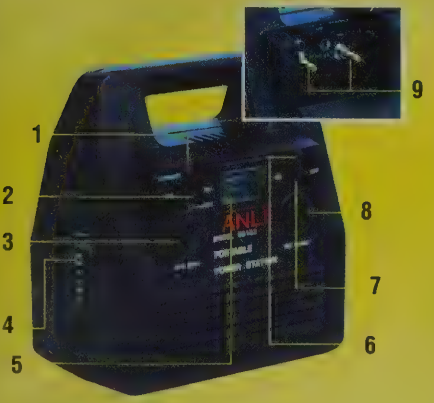

1. LED Charging Indicator
2. DC 3-6-9v Selector Switch
3. Charge Input Cigarette Socket
4. DC 3-6-9v Output Connector
5. Voltmeter
6. LED Power "On" Indicator
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SB - 152 6.5AMP/HR

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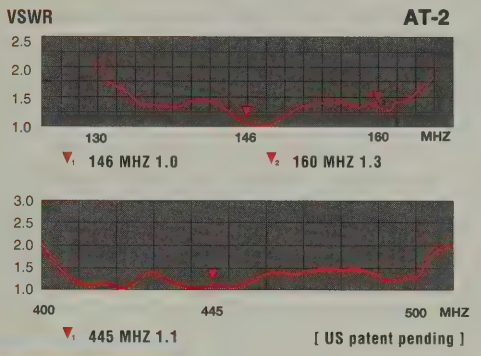
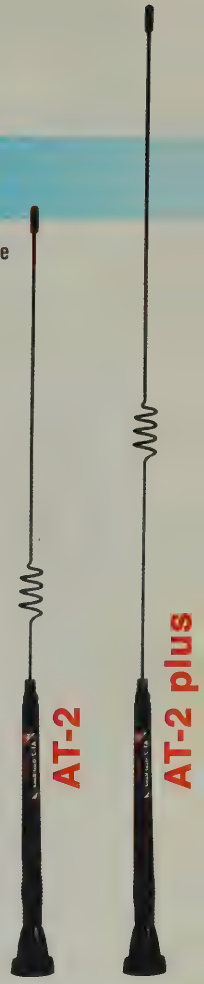
AT-2A plus	146 / 220 MHZ 4.1/4.8 db
AT-2 plus-TRI	146/ 220/445MHZ 4.1/4.8/6 db



[US patent pending]



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Mounts

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ANGLE ADJUSTABLE

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WINDOW MOUNT

TA-1 Angle Adjustable Trunk Mount NMO/UHF

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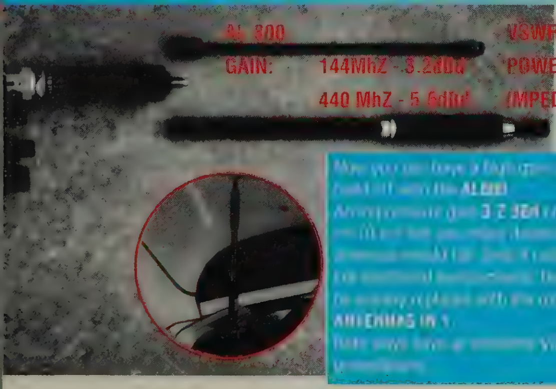
2 IN 1 High Gain Antenna



AL 800
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440 MhZ - 5.6dBd
VSWR: less than 1.4
POWER: 50W MAX.
IMPEDANCE: 50 ohms.

Now you can have a high gain antenna on your [illegible] with the AL 800 [illegible] gain 3.2 dBi [illegible] 5.6 dBi [illegible] **2 ANTENNAS IN 1** [illegible]

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2
3 2 IN 1 MODEL
4 **RD-78:** *144/440/900MHz 2.15/3db* 15" Wide Band, also for scanning
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6 **AT-3:** *144/440MHz 2.15dbi/3db* 100W 1'5" UHF only
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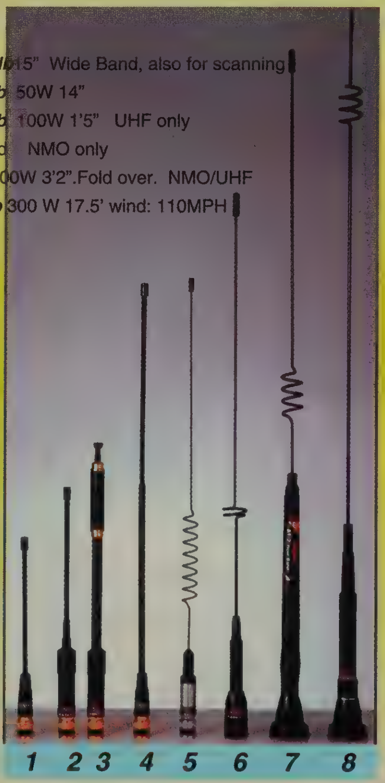
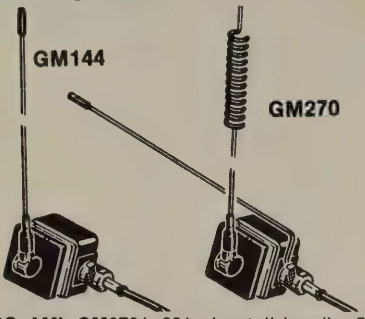
9 **A-1000:** *144/440MHz 8.5/11.8 db* 300 W 17.5' wind: 110MPH

S-1 (Antenna)
WA-1 (Mount)
With the WA-1 Windows Clip Mount, you can mount your H.T.(or ANLI S-1) Antenna to your car window or sunroof.



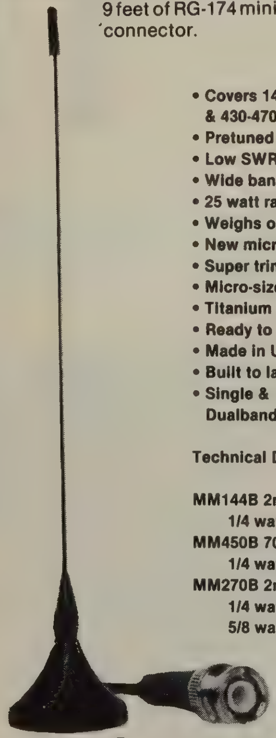
MADE IN THE USA

PRO•AM's GM144 is 27.5 inches tall, handles up to 50 watts and covers 144-148 MHz with SWR below <1.5:1 across entire band (tunable via interior coupling unit). Gain is 2.5 dB. Almost doubles your transmitted signal strength and extends receive range accordingly. You will be delighted with the results.



PRO•AM's GM270 is 26 inches tall, handles 50 watts, and covers 144-148 plus 440-450 MHz with SWR less than <2:1 at band edges (tunable via interior coupling unit). Gain is 2.6 dB 2m and 6.3 dB 70cm. A real tiger!

"Stylish, trim, and petite" only begin to describe PRO-AM's exciting new 2 meter, 70 cm, and dualband mobile antennas. They feature a slender black chrome whip and small candy kiss-size base that looks terrific on any auto. Inside the little 1⅛ inch diameter base is a newly-developed and ultra-strong titanium magnet that holds in place like a bulldog, even at high speeds. These new micro magnet antennas are supplied fully assembled and ready to use, with 9 feet of RG-174 mini coax and BNC connector.



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Technical Data

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1/4 wave whip
MM450B 70cm: 6.5″ tall
1/4 wave whip
MM270B 2m/70cm: 19″ tall
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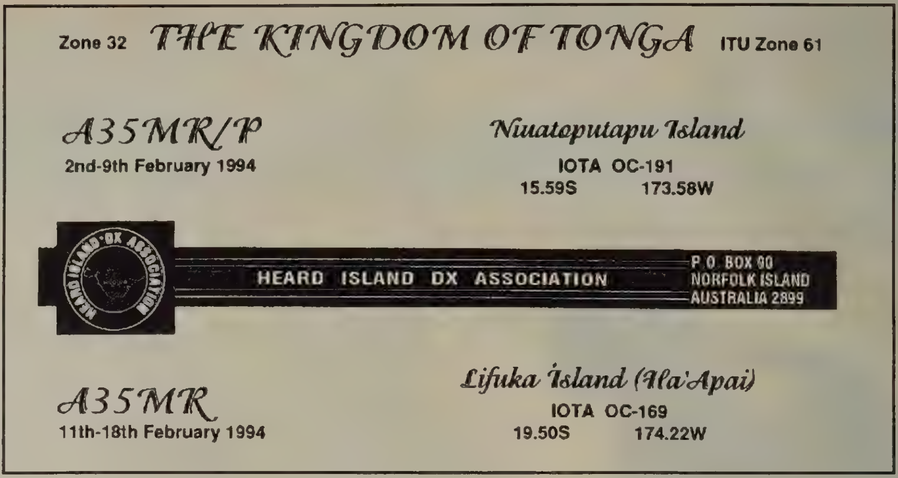


Zone 32 THE KINGDOM OF TONGA ITU Zone 61

A35MR/P
2nd-9th February 1994

Niuatoputapu Island
IOTA OC-191
15.59S 173.58W

HEARD ISLAND DX ASSOCIATION
P O BOX 90
NORFOLK ISLAND
AUSTRALIA 2899

A35MR
11th-18th February 1994

Lifuka Island (Ha'Apai)
IOTA OC-169
19.50S 174.22W

QSL card for this DXpedition.

flat. The small charger he had carried simply could not charge the battery fast enough. Of course, back in Vava'u his battery was very large, and the steady trickle charge was sufficient for most circumstances.

To overcome the problem, Kevin shared my rig for a few days, but it was not really an ideal arrangement. I then took a chance and connected his rig to my Kenwood PS 52 heavy-duty AC power supply. Fortunately, it was able to handle both rigs, and this is how we worked from then on. No more battery problems.

We had some problems with interference between stations, but there was little to be done, as proper grounding was a major problem. We both came to accept the situation; at least we could both operate. There was one other awkward situation: we didn't run the generator after about 2200 hours local (1100 UTC). It just didn't seem right to have the generator running when all others around us were asleep.

After a few hours of operation we had well over the minimum number of QSOs and number of countries worked for the island to be given a number. Very soon after, Roger, G3KMA, the IOTA Director, was kind enough to allocate OC-191 to Niuatoputapu Island. The un-numbered island of Tonga was no more, and Kevin and I went on to work as many of the island chasers as possible. I signed A35MR/P, as I wanted to differentiate between any of my later A35MR operations.

I must mention the generosity and the kindness of the islanders with whom we came in touch during our activities on the island. The visit was very special because Kevin was known to many from his previous stay. It was also special because of Kevin's fluency in Tongan and his unique knowledge of the Tongan people. The children loved us. On the way to school, they had to pass our door, and it was the same story on their way home. They really wondered what we were doing. When Kevin was speaking into a microphone it was okay, but when I was sending Morse code, the children were baffled. During my daily sked with Kirsti, VK9NL, many of the children and people around said hello. Sister Loleta had quite a long chat with Kirsti, asking about Norfolk Island, and so on.

Like all DXpeditions the time passed in a blur. Fueling the generator, eating, sleeping, and operating became a vicious cycle. Band conditions after February 5th were terrible, with hours of dead bands, and we fought for every QSO. During our stay many were chasing Peter 1, so this also contributed to low QSO rates. However, there were some good openings, and one of the highlights was working Peter 1 on 20 and 40 meters SSB—100 watts and an HF6V. Many JA stations were worked on several bands.

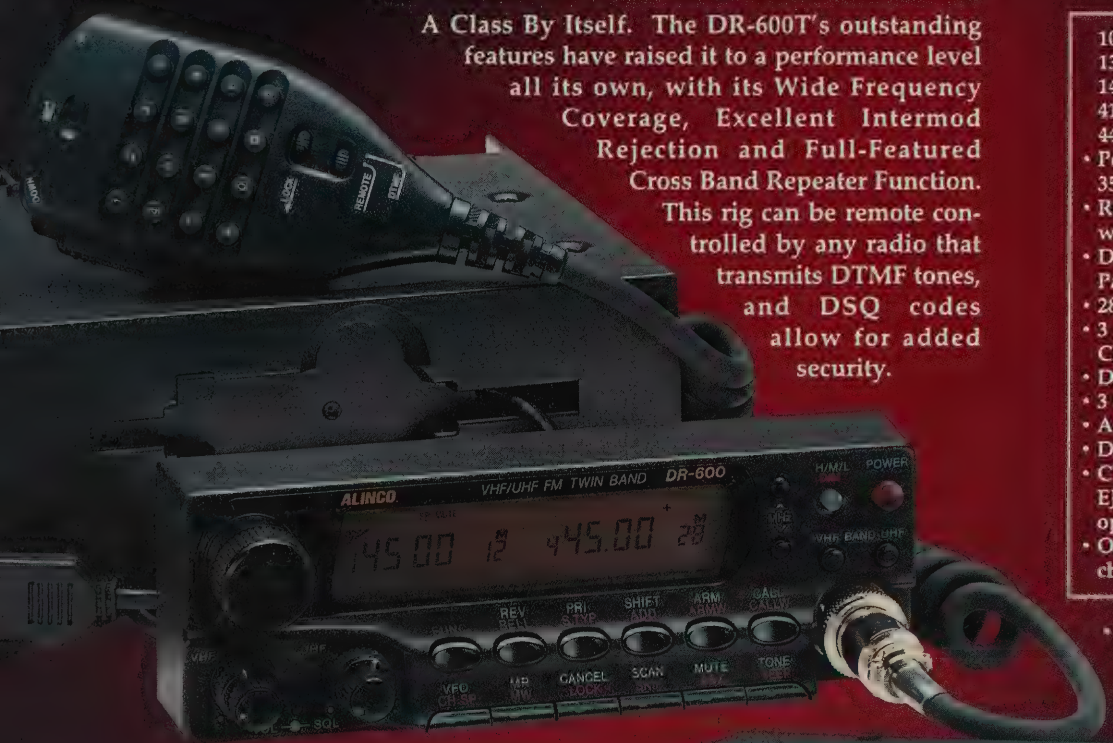
In due course the day of our departure came near. We had a one day extension, however, since the plane went on a rescue mission to Tin Can Island and airlifted two very sick people. Then it was time to take the antennas down, get our equipment packed, and finally we were once again at the small airfield. It was time for good-bye. With some 3200 QSOs in my A35MR/P log I was sure that most of the island chasers had worked OC-191, the brand new IOTA Island that A35KB and A35MR/P had created.

We were soon back in Vava'u, and a couple of days later I was once again traveling. This time I set up a station on Lifuka Island in the Ha'Apai Group, OC-169, but that's another story. Some 3000-plus QSOs later, signing A35MR, I was once again packing up and finally on my way home, heading for Norfolk Island.

The Friendly Islands is a very good name for the Kingdom of Tonga, as that was exactly what I found. Perhaps I will return one day. Minerva Reef, OC-055, is badly needed by Island Hunters. ■

DEMAND THE BEST

DR-600T/B (DUAL BAND MOBILE)



A Class By Itself. The DR-600T's outstanding features have raised it to a performance level all its own, with its Wide Frequency Coverage, Excellent Intermod Rejection and Full-Featured Cross Band Repeater Function. This rig can be remote controlled by any radio that transmits DTMF tones, and DSQ codes allow for added security.

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- Remote Control Operation with an H.T.
- Detachable Front Control Panel with remote cable option
- 28 Memory Channels
- 3 Auto Dialer Memory Channels
- DSQ Paging Feature
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* Requires simple modification

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DJ-G1T

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CQ's Golden Anniversary Gala Is underway! Here's how YOU can get in on the fun!

It's Party Time!

BY RICHARD S. MOSESON, NW2L

It's *CQ*'s 50th anniversary! And you're invited to join the celebration! Here's a quick rundown of what's in store for you as we begin our anniversary year.

•**Special Commemorative Issue:** This issue of *CQ* is destined to become a collector's item. Look for our special anniversary section with a comprehensive history of ham radio since 1945, a journey through major changes on the world scene and in technology, plus highlights of *CQ* history as told by participants. *Plus,* we have special greetings from President Bill Clinton, Vice-President Al Gore and FCC Chairman Reed Hundt!

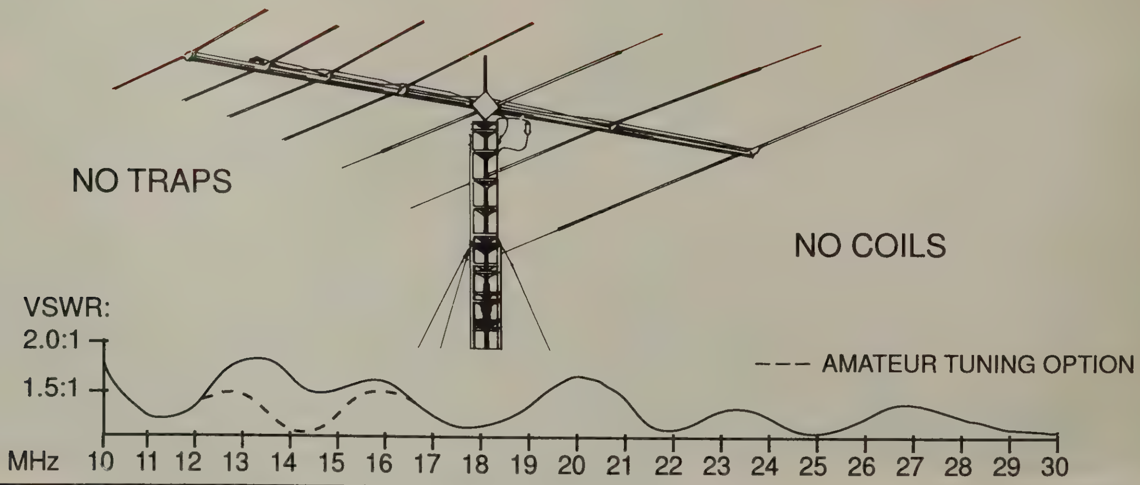
•**The *CQ Gang* Activity, January 1–15 ONLY:** This is our anniversary kickoff event. Between January 1 and 15, anyone who has ever been connected with *CQ* (even if you wrote one article 35 years ago) may sign "/50" after his/her callsign; you can win a great certificate by working as many "/50" stations as you can. (See complete rules in November 1994 *CQ,* or on the ham radio areas of CompuServe, GEnie and America Online.) Rules, log sheets and application forms are also available for a large SASE to "*CQ* Gang Awards," c/o *CQ, The Radio Amateur's Journal*, 76 N. Broadway, Hicksville, NY 11801.

•**The CQ/50 Gold Awards:** All year long you'll have the chance to discover new ways to enjoy ham radio and to challenge your operating abilities while you work toward this award and its many endorsements. The basic award is earned simply by contacting 50 other hams on the radio, and the challenges grow from there. Details were published in October 1994 *CQ,* and once again are posted on America Online, Genie and CompuServe. Rules, log sheets and application forms are available for a large SASE to "CQ/50 Gold Awards," c/o *CQ, The Radio Amateur's Journal*, 76 N. Broadway, Hicksville, NY 11801.

•**Announcing The CQ GOLDEN GIVEAWAY!!!** You can win an all-expense-paid trip for two to the 1996 Dayton Hamvention®, or $5,000 cash, if you're our grand prize winner! Additional major prizes include shopping sprees at the ham radio dealer of your choice. And we'll have dozens and dozens of prizes from our own collection of *CQ* magazines, books, videos and other goodies. Details and the complete rules are on the facing page.

We hope you'll enjoy this special anniversary issue and that you'll join in our celebrations, both on and off the air. ■

KLM 10-30-7LPA Continuous Coverage 10-30 MHz



KLM's 10-30-7LPA may be the last antenna you will ever need. Complete coverage of the spectrum, 10 through 30 MHz available on a single feedline! This includes 20, 15 and 10 meters as well as MARS, WARC bands, and even 27 MHz CB. Typical 7 dBd gain on all bands. Originally developed for military and commercial applications this log periodic has gained favor with hams around the world. Easy to upgrade with our 40 meter dipole and our SK-8 conversion kit. See increased F/B and gain comparable to 2 element 40 meter beam.

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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

CQ Goes Gold

Golden anniversaries are always special, and *CQ*'s big event is no exception. Still, it's hard to believe that it was 50 years ago this month when the first issue of *CQ* was published by Radio Magazines, Inc. as a successor to *Radio* magazine, a journal for broadcast engineers and technicians. Yours truly was there—well, sort of, at least in the sense that I was nearly four years old at the time, but admittedly was not at all interested in amateur radio, much less in antennas.

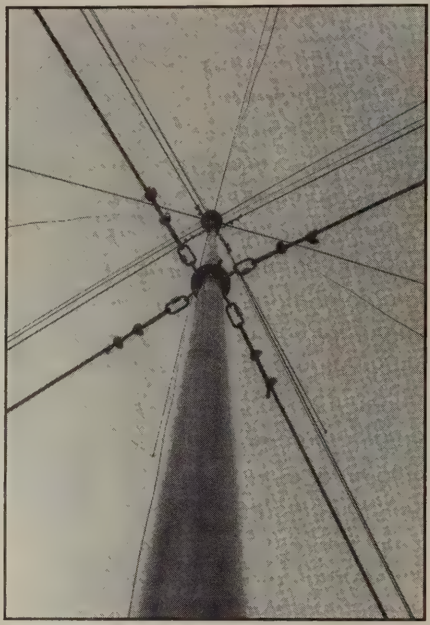
Antenna technology has not changed radically over the years. Rather, we have witnessed a slow progression and evolution of the science and its gradual adaptation to amateur radio needs. When the first issue of *CQ* hit the presses in January 1945, it had been only about 23 years since the development of the now-classic Wave Antenna by Dr. Harold H. Beverage. And it was only about 17 years after the invention of the Yagi-Uda directional parasitic array in Japan in the late 1920s by the eminent scientist Dr. Hidetsugu Yagi and his colleague Dr. Shintaro Uda.

It would be five years before Dr. John D. Kraus, W8JK, Professor of Electrical Engineering at Ohio State University, published his 1950 landmark book *Antennas.* In it he would provide a unified treatment of antennas from the electromagnetic theory point of view while keeping in mind the importance of the engineering involved.

In January 1945 World War II's end was months away, and radio amateurs were still legally off the air and "on vacation" from hamming because of wartime security requirements—and most amateurs were off to war anyway. These circumstances found them mostly *dreaming about* antennas instead of experimenting with them or erecting them.

Amateurs also were pursuing all sorts of alternative activities that didn't involve actually *radiating* a signal—such as experimenting with two-way "carrier current" and other substitute communications schemes. In fact, it wasn't until late August 1945 that radio amateurs got back even one band for them to return to the air. Still, this tardiness was better than what happened after World War I, when it took almost a year after the 1918 armistice for a return to "radio normalcy."

Following World War II some of the events that prompted both amateur and commercial antenna development included increasing military interest in the farthest reaches of the electromagnetic spectrum, at the lowest and highest ends alike; the use of ever-higher VHF, UHF, and SHF frequencies by commercial users; the development of TV and FM broadcasting and antennas for these services; and the special and demanding antenna needs of space vehicles such as the Space Shuttle, satellites, and space probes. Taken together, all of these things helped "push the antenna envelope" to favorably impact the evolutionary development and improvement of antennas for amateur radio.



The Capacitance Terminated Short Vertical Radiator (CTSVR) is a multiband HF vertical antenna system that does not use any traps to achieve its performance. The antenna requires a 25 ft. by 25 ft. area in your lot or yard. It is offered by Uni-Hat Corporation. (Photo courtesy Ed Goodman, N5NUG)

While *CQ* is best known as a DXing, contesting, and operating publication, its editors—beginning with *CQ*'s first editor, John H. Potts, and continuing through today's Alan Dorhoffer—always have maintained the tradition of fostering antenna development and experimentation. One of the first antenna articles in *CQ* was a practical, two-part series on amateur antenna construction and design for the "ultrahighs" by Arthur H. Lynch, W2DKJ. The first part, "Elementary Antennas for UHF Transmission," appeared in the April 1945 issue; the second, "Antennas—And What Holds Them Up," graced the May 1945 issue. Also in the same May issue was "A Simple Rotary Antenna Support," an antenna article by prolific *CQ* author and Assistant Editor Larry LeKashman, W2IOP.

Going back through *CQ* we find that while most issues at least mentioned antennas, and many had feature articles devoted to skyhooks, a regular antenna column was years away. Well-known columnist and book author Bill Orr, W6SAI, regularly contributed articles—not just on antennas—to *CQ* over the years. His antenna-oriented feature articles became increasingly prominent in *CQ* in the early '70s. Finally, in the December 1973 issue *CQ* inaugurated Bill's long-running, monthly "Antennas" column, a fixture for the rest of the decade.

Bill continued to write for *CQ* until February 1980, when he moved to *Ham Radio* magazine to continue his column there. His departure would have left a prominent hole in *CQ*'s technical coverage, so editor Alan Dorhoffer, K2EEK, asked me to fill Bill's rather large shoes in March 1980. I took over the "Antennas" column at that time and have been writing it ever since. Whipping out my calculator, that works out to around 179 monthly columns since then. So far, knock on wood, we haven't missed a single issue. (For the record, Bill's back in *CQ* with his popular and far-ranging monthly "Radio Fundamentals" column.)

Thus, our stewardship of the "Antennas" column has been going strong since 1980, although my acquisition of Commodore VIC and C- 64 "home computers" in 1982 caused the computer bug to "byte" me badly. This growing interest eventually worked its way into the column, so much so that we regularly wandered off the beaten path of antennas. What to do? Could a hybrid brew of antennas, software, and PCs mix?

Rather than miss out on our developing interest in computers and software, with its sure-to-be-felt impact on amateur radio, Alan and I capitalized on it by broadening the scope of the column. We changed its name from "Antennas" to "Antennas and Accessories" in May 1985 to encompass more editorial material of interest to all of *CQ*'s readers. In other words, we began to look at the hamshack from *both ends* of the coax. Now your columnist appears on the masthead as *CQ*'s "Antennas and Software" editor to better reflect the duality of our interests and writing emphasis.

Happy 50th, *CQ,* and may you have many, many more!

Antenna Topix

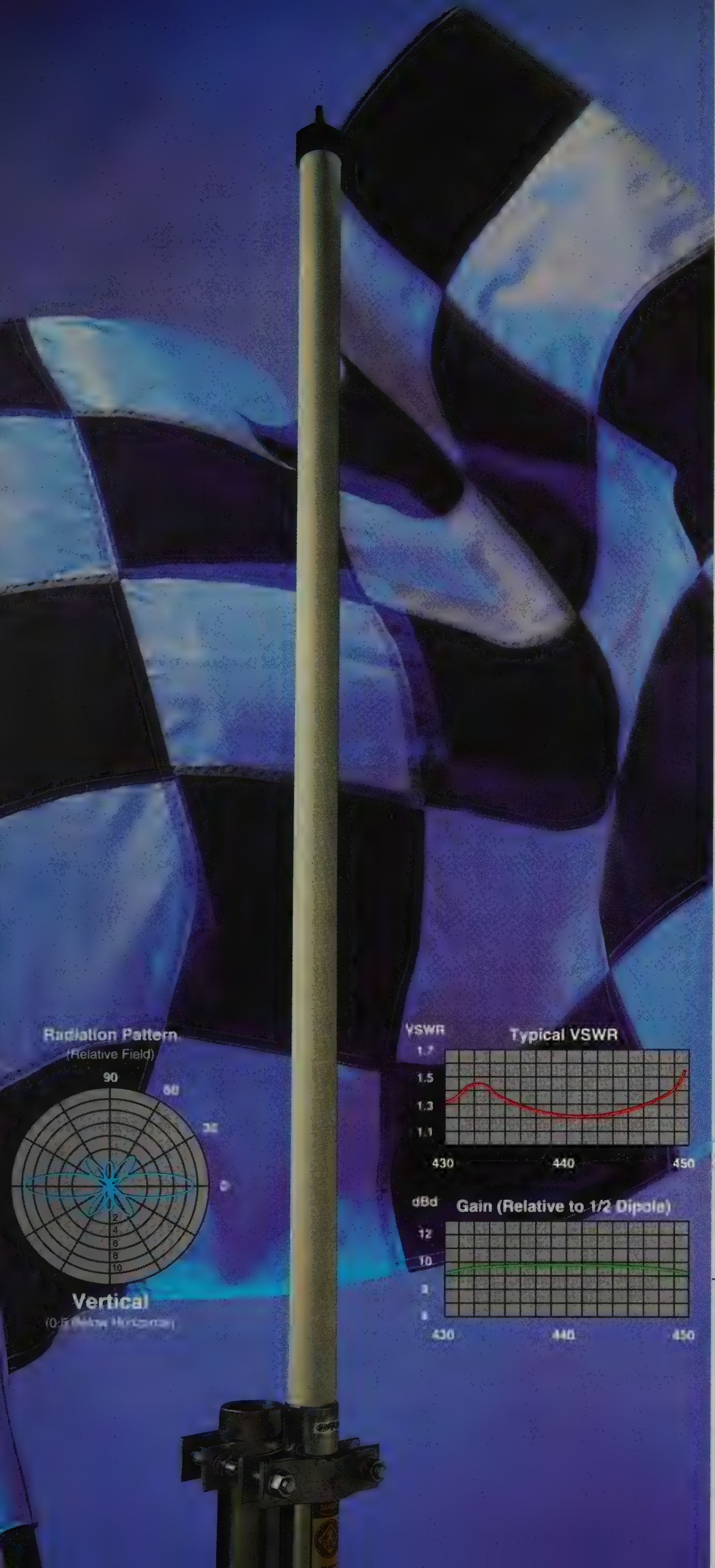
Capacitance Terminated Short Vertical Radiator (CTSVR). Ed Goodman, N5NUG, of Uni-Hat Corporation's Engineering and Marketing Group sent me a packet of information on the CTSVR antenna (patent pending). It depicts an interesting device.

The CTSVR is a compact, 31 ft., 3 in. tall five-band vertical antenna system covering 160, 80, 40, 17, and 10 meters. It's a top-loaded, low-loss design that uses no traps to achieve good performance in a short vertical radiator. The system features heavy-duty construction, stainless-steel hardware, and a single coax feedline.

The antenna requires an area 25 ft. by 25 ft. in your lot or yard to achieve full four-band operation. It needs a ground system consisting of one 8 ft. ground rod at the base of the

---

289 Poplar Drive, Millbrook, AL 36054



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From the forge of world-wide competition comes the new Hustler *Spirit* series of vertical antennas.

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Name ______________________

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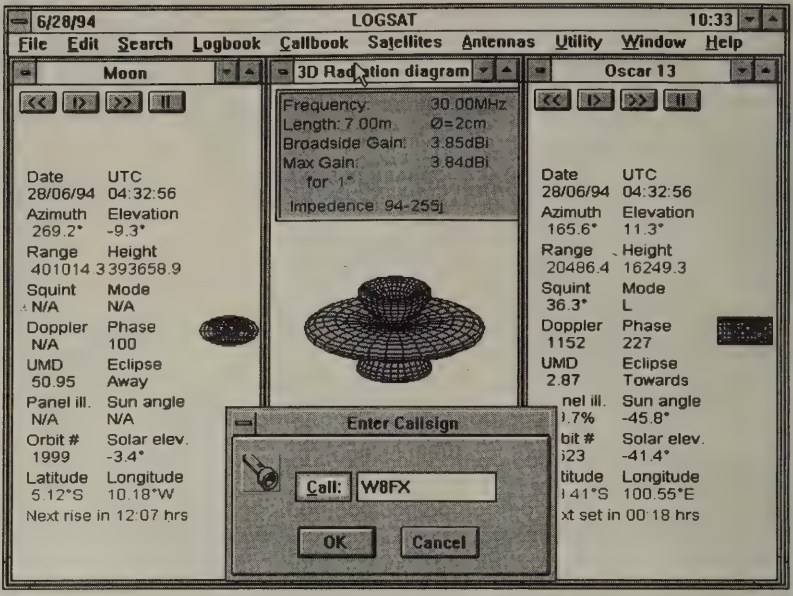
City ______________ *State* ______ *Zip* ________ antenna with a minimum of six radials, each 34 ft. long. Excellent bandwidth is claimed with a proprietary, easily tuned matching system. Retuning the antenna's center operating frequency is accomplished from the ground on all bands.

The CTSVR is rated at 1.5 KW CW or 1.8 KW SSB. It has a feedpoint impedance of about 50 ohms with a claimed SWR at resonance of 1.5:1 or better. The 2:1 bandwidth points range from 50 kHz on 160 meters to the whole band on 17 meters. The 47 lb. antenna's footprint, with guy wires, is 625 sq. ft., and the wind surface area is 9 sq. ft. Price is $499 plus shipping.

For more information, contact Uni-Hat Corporation, 3816 Royal Lane, Dallas, TX 75229 (1-800-807-5646).

Electronic Switch Antenna Products. The Electronic Switch Company imports high-quality amateur antennas and accessories from various German manufacturers, including Hofi, Schurr, and Kurt Fritzel. The firm makes these products available through major amateur distributors such as Ham Radio Outlet, Universal Radio, and Oklahoma Communications Center.

The antenna products offered include a six-band, coax-fed Windom antenna; a five-element, 14/21/28 MHz HF beam; a three-element, 14/21/28 MHz beam which also sports a single 18/24 MHz element; four trap verticals covering 3.5-28 MHz in various combinations; and a 12-30 MHz vertical monitoring antenna. Several low-loss Hofi coaxial switches, associated remote-control boxes, and a coax lightning protector are available. The firm also offers the popular Schurr Morse keys.



```
Date        UTC
28/06/94    04:32:56
Azimuth     Elevation
 269.2°     -9.3°
Range       Height
 401014.3 393658.9
Squint      Mode
 N/A        N/A
Doppler     Phase
 N/A        100
UMD         Eclipse
 50.95      Away
Panel ill.  Sun angle
 N/A        N/A
Orbit #     Solar elev.
 1999       -3.4°
Latitude    Longitude
 5.12°S     10.18°W
Next rise in 12:07 hrs
```

```
Frequency:         30.00MHz
Length: 7.00m      Ø=2cm
Broadside Gain:    3.85dBi
Max Gain:          3.84dBi
   for 1°
 Impedence: 94-255j
```

```
Date        UTC
28/06/94    04:32:56
Azimuth     Elevation
 165.6°     11.3°
Range       Height
 20486.4    16249.3
Squint      Mode
 36.3°      L
Doppler     Phase
 1152       227
UMD         Eclipse
 2.87       Towards
 nel ill.   Sun angle
 .7%        -45.8°
bit #       Solar elev.
 23         -41.4°
titude      Longitude
 41°S       100.55°E
xt set in 00:18 hrs
```

Call: W8FX

Fig. 1– LOGSAT is a multipurpose, shareware Windows program dedicated primarily to the real-time tracking of satellites orbiting the earth. But it also keeps a logbook and callbook, analyzes antennas, and more. Its author is Roberto Franceschetti, IK8SQI, who offers a registered version for $25.

For product information flyers, Contact Electronic Switch Company, Inc., Suite E-6, 4343 Shallowford Road, Marietta, GA 30062 (404-518-4634).

Arrow Antenna Fox Hunt Products. Allen Lowe, N0IMW, notes that his main interest in amateur radio lies in the VHF and UHF bands, with a special passion for fox hunting. As a result he sent me details on his line of fox-hunting products. These include a five-step attenuator, a smaller "active attenuator," a five-ele-

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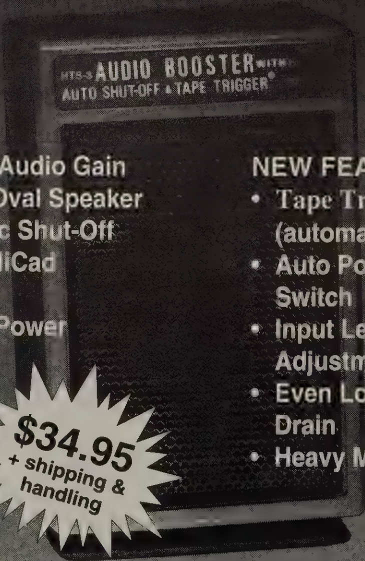

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Work signals the competition can't even hear. Low phase noise makes it possible.

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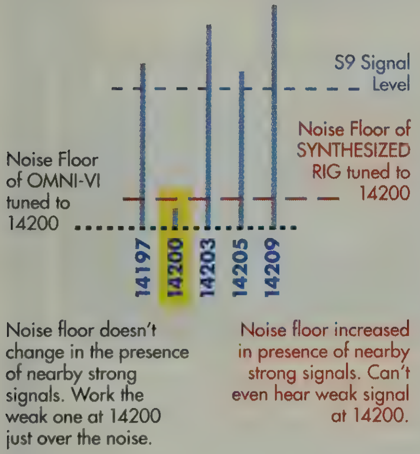
"How often will I notice the difference in my shack?" The answer depends on your operating interests. A DXer who chases the rare ones may enjoy the OMNI-VI advantage in over half his contacts. If you chase DX on the noisy 80 and 40 meter bands, you may enjoy the advantage 80% of the time. A Contester has the competitive edge for the entire contest weekend.

Let's compare the OMNI-VI to any competitor's synthesized rig with both tuned to the same frequency.

5 Typical Signals on a Crowded Band



Phase noise causes the noise floor to *temporarily* increase covering weak signals *inside* your passband especially when strong signals *outside* your passband are within a few KHz of where you'd like to listen.

Crystal mixing

OMNI-VI is the only modern high performance amateur transceiver to use crystal mixing—chosen over a synthesizer because it provides the very best phase noise performance of any technology. Phase noise is essentially eliminated as a factor in receiver performance. Treat yourself to the best on HF.

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OMNI-VI also features

Superb Selectivity - cascading filters from both I-Fs for a minimum of 16 poles of filtering. Up to 4 accessory filters can be added providing 20-24 poles of filtering.

"DSP" Automatic Notch Filter instantly and automatically eliminates interfering carriers at the touch of a button.

SPORT PC Interface - Fastest, most comprehensive interface in the industry.

"User Option Menu" lets you customize operation of the rig to fit your personal preferences.

Bandstacking registers, single button band change, Programmable CW transmit offset with auto tracking sidetone, Full QSK, Iambic keyer and oven stabilized timebase.

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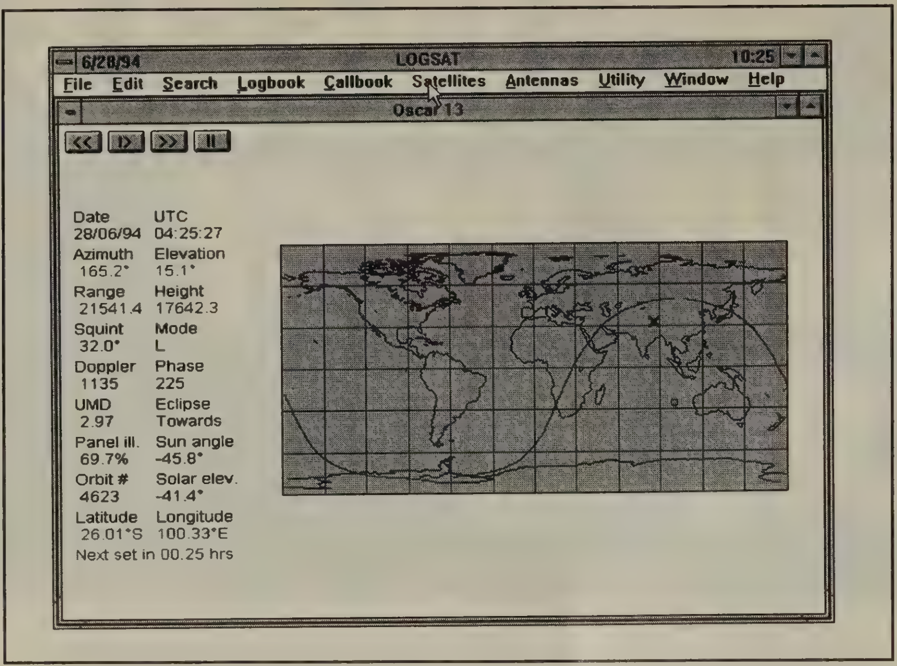


Date 28/06/94	UTC 04:25:27
Azimuth 165.2°	Elevation 15.1°
Range 21541.4	Height 17642.3
Squint 32.0°	Mode L
Doppler 1135	Phase 225
UMD 2.97	Eclipse Towards
Panel ill. 69.7%	Sun angle -45.8°
Orbit # 4623	Solar elev. -41.4°
Latitude 26.01°S	Longitude 100.33°E

Next set in 00.25 hrs

Fig. 2– Although it offers multiple capabilities, LOGSAT is at heart a satellite tracker. After you select a satellite, you can choose the type of map projection on which you want to view the satellite. The five available projections are Mercator, equidistant cylindrical, sinusoidal, hammer, and orthographic. (See the text of this month's column for details on LOGSAT.)

ment 440 MHz beam, and a wide bandwidth, four-element, 146 MHz beam. The latter antenna is also available for any frequency from 121 to 170 MHz.

Arrow's primary product is the Fox Hunt Attenuator, a heavy-duty RF signal attenuator designed to reduce the received signal for radio direction finding. It offers a total of approximately 75 dB of attenuation in 5 dB steps. It's constructed of double-sided copper and fiberglass PC board, and it sports full-size slide switches for reliability. The resistors used are 1/8 watt types soldered directly to the switches with very short leads. Priced at $49, UHF or BNC connectors are available.

The "Active Attenuator" also is offered. It's a smaller unit, especially for use on foot hunts. A turn of its dial cuts down the signal even when you're but a few feet from the transmitter. Attenuation is continuous. It's $59.

For more information, contact Arrow Antenna, 1461 Peacock Pl., Loveland, CO 80537 (303-663-5485).

Marine Technology Filters. Have you had your fill of mobile interference problems? Marine Technology, Inc., offers relief with two heavy-duty automotive electrical interference filters. The filters, which are similar but have different current-carrying capacities, are low-pass LC designs, each having a series choke and a shunt capacitor.

The filters can be connected in two ways. One is to connect them in the power leads of a transceiver, transmitter, PA system, or automotive sound amplifier so as to keep alternator whine and other noise in the vehicle wiring system from interfering with the equipment. A second method of connection has the filter placed in the power leads to noise-producing devices such as DC motors, inverters, and the like to prevent interference produced by the accessory from entering the vehicle's electrical system.

The EMI-P15A Filter is rated at 20 amperes continuous service at 13.6 VDC nominal; it's $34.95. The EMI-P30A filter is rated at 30 amps continuous service; it's $39.95. An instructive application note and a spec sheet are available from Marine Technology, Inc., 2667 E. 28th St. #505, Signal Hill, CA 90806 (1-800-772-0796).

Max-Gain Systems Fiberglass Update. In last June's column we highlighted the fiberglass products offered by R. Allen Bond, WB4GNT, through his Max-Gain Systems. As we noted, Max-Gain is a major source of small quantities of a wide range of reasonably priced fiberglass products suitable for amateur use.

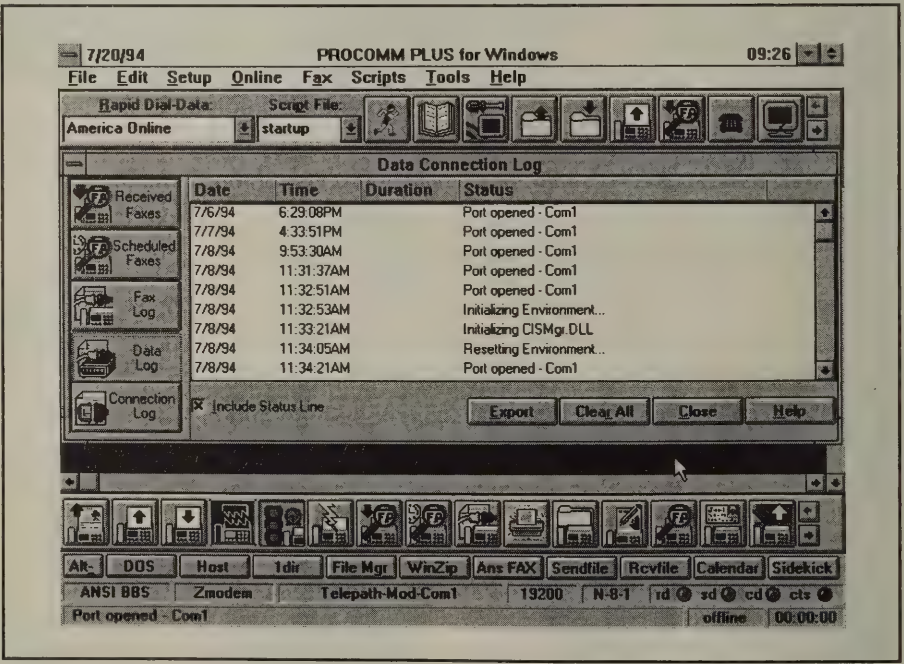
Max-Gain stocks a complete line of solid rod, round tube, and square tube fiberglass for antenna construction and other hobby purposes. It also sells four types of fiberglass quad spreaders with usable lengths to as much as 26 ft. (in the case of the Antenna Mart Type 4 "Monster Spreader").

In a recent letter Allen reiterates that the telescoping or sleeving characteristic of his line of fiberglass is one of its strongest features. Since most sizes are designed to "sleeve" inside the next larger size, this allows easier handling and the ability to ship via UPS, with its 8 ft. maximum length. Under this concept you can custom assemble any needed length and/or wall thickness, depending on the anticipated load. Allen also stresses that he strives to ship 99% of orders within 24 hours of receipt, and most within 6 hours.

For a fiberglass stock price list, details on spreaders, and a very useful application note, contact Max-Gain Systems, Inc., 221 Greencrest Court, Marietta, GA 30068-3825 (404-973-6251).

Software Notes

LOGSAT. Roberto Franceschetti, IK8SQI, sent me a novel multi-purpose, satellite-oriented software program, LOGSAT (previously known as LOGWIN). His shareware program is dedicated primarily to the real-time tracking of satellites orbiting the earth. But it also keeps a logbook and callbook, analyzes antennas, and does a few other neat things. Writes Roberto:



Rapid Dial-Data: America Online

Script File: startup

Data Connection Log

Date	Time	Duration	Status
7/6/94	6:29:08PM		Port opened - Com1
7/7/94	4:33:51PM		Port opened - Com1
7/8/94	9:53:30AM		Port opened - Com1
7/8/94	11:31:37AM		Port opened - Com1
7/8/94	11:32:51AM		Port opened - Com1
7/8/94	11:32:53AM		Initializing Environment...
7/8/94	11:33:21AM		Initializing CISMgr.DLL
7/8/94	11:34:05AM		Resetting Environment...
7/8/94	11:34:21AM		Port opened - Com1

☒ Include Status Line

ANSI BBS | Zmodem | Telepath-Mod-Com1 | 19200 | N-8-1

Port opened - Com1 | offline | 00:00:00

Fig. 3– PROCOMM PLUS for Windows 2.0 is a a major upgrade to Datastorm's longtime best-selling communications software. The new upgrade seamlessly combines FAX and data capabilities, rather than bundling two separate programs into a "communications suite." For the first time in PROCOMM, you can easily send, receive, and manage FAXes, either directly from your application programs or through PROCOMM alone.

"I'm an electronics engineering student, with a passion for ham radios and computers. I've written several programs regarding antennas, propagation, and transmission lines using the knowledge I'm getting during the course of my studies. Programs that take care of these things are already around, so I never bothered to distribute mine. But I've never seen a program running under the Windows operating system that tracks satellites, keeps the station log, and a few other things."

LOGSAT consists of five major sections. These are the Logbook, Callbook, Satellites, Antennas, and Locator Sections. The Logbook can accommodate multiple logs and calculate azimuth and distance to the other station; the Callbook lets you search by callsign or parts of a call, or look for names and addresses.

The Satellites Section is at the heart of the program. It lets you choose which of five different map projections you prefer; you also can open up to five satellite windows at the same time. The Locator Section, found in the utility menu, contains a simple to use converter to convert grid locator data to latitude and longitude and vice-versa; you can display the selected location on a map as in the Logbook Section.

The Antennas Section is particularly interesting, with its antenna and propagation utilities. You can, for example, draw a three-dimensional radiation diagram for any vertical dipole antenna in free space. The isotropic gain and input impedance are calculated. If that isn't enough, you can analyze the behavior of a dipole on a frequency of interest with respect to the isotropic gain, input resistance, and reactance. This is useful if you want to see how your dipole behaves on frequencies other than the design frequency. You can do the opposite, too, keeping the frequency fixed and vary the dipole's length to see the effects.

You also can analyze the electric field and attenuation factor along a path between two antennas, both over the earth considered as a flat surface and as being round. The study of low-frequency ground waves propagated by diffraction around the earth is active only in the registered version of the program. However, you're able to consider the effects of atmospheric refraction in the unregistered version (see figs. 1 and 2).

LOGSAT is shareware that you are free to use for evaluation for up to 30 days. You may be able to find it on amateur radio bulletin boards (BBSes) under the filename LS2-30.EXE (a self-extracting file). You can register the program by sending $25 US to Roberto Franceschetti, IK8SQI, Via del Faro 19, Bacoli, Naples, Italy 80070. You'll be sent the latest registered version of LOGSAT on a 3.5 inch diskette.

CT Key Top Overlays. I suspect that there are more than a few dedicated users of the popular contesting program CT™ reading this. Ken Wells, V73C, offers a specialized product for CT Versions 8 and 9. It's a set of custom key overlays that fit over your computer's function keys and show the mode and commands for each key. Also included are front key covers to retain the function key legends. The overlays help you spend less time searching for the correct function key, for commands in the user's manual, and for the right spot in the online help.

The overlays are similar to those you might purchase for your favorite wordprocessing program, and the color legend for the overlays is the same as in most popular wordprocessing programs. On full-size computers the overlays fit well, but they are a bit too large for some notebook/laptop function keys. However, you can trim them down or stick them on the computer's case just above the function key row if you prefer.

Ken's company is called High-Rate Products (with the idea that you'll boost your contest QSO rate using them). However, in that he has an APO address, he can't accept orders directly. Rather, the overlays are exclusively distributed by the Oklahoma Comm Center, 13424 Railway Dr., Oklahoma City, OK 73114 (1-800-765-4267). They're $14.95 plus shipping. (If you want to contact High-Rate directly, contact Kenneth R. Wells, V73C, P.O. Box 1255, APO AP 96555-0008—but *don't* send him orders at that address. Ken adds that a new "power user" overlay set that includes all keys for DVP and packet functions is due to be out shortly.)

SCANCAT and SCANCAT Pro. In the October 1992 column we described a very flexible transceiver/receiver control and frequency database program developed by John Shidler, NS5Z, and James Springer, N5JMZ. SCANCAT was designed originally to manage a wide variety of computer-based radios from an IBM PC or compatible. The main objective in creating SCANCAT was to offer an easy-to-use program that lets you run *all* supported radios from a *single* program, instead of having to purchase a separate control program for each radio you use.

The enhanced SCANCAT 5.0 currently sup-

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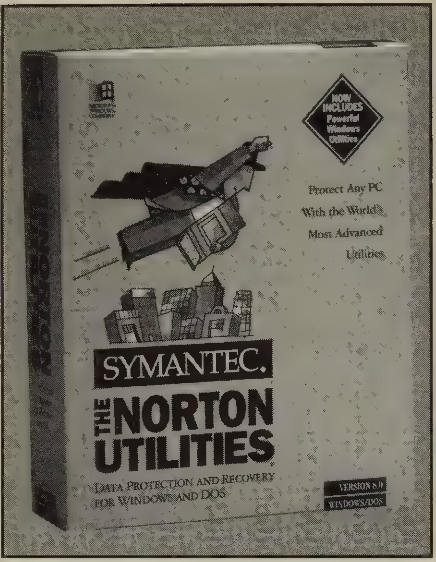
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VERSION 8.0
WINDOWS/DOS

The Norton Utilities 8.0 is an integrated utility collection that offers advanced tools for protecting data, enhancing PC performance, and conducting preventive disk maintenance both under DOS and Windows. The latest version contains all the powerful DOS-based disk and file protection utilities, plus significant new Windows-specific tools. (Photo courtesy Symantec Corporation)

ports almost all microprocessor-based receivers and transceivers. Brands supported include AOR, ICOM, Kenwood, JRC, Yaesu, and Realistic (certain models). Since SCANCAT supports all radios from within one program, with a simple pop-up menu choice you can easily select among several radios. The program lets you scan between two frequencies, and also create and scan disk files.

You can readily search for new frequencies and log them to disk. And with most radios you can do a spectrum analysis while you're scanning and listening. A nice plus is that virtually any frequency file created by one radio can be used by another, as long as the modes are compatible. SCANCAT 5.0 is $49.95 plus s/h, and a fully functional demo is $5, applicable to purchase.

A new, advanced version of SCANCAT now is available in the form of SCANCAT-PRO. The new program has several enhancements. These include a database file import ability to let you take advantage of commercially available disk-based frequency files; multiple scanning banks (15 in all) to permit you to scan several different frequency banks in the same pass; unlimited frequency file size; and the ability to control two ICOM radios simultaneously. SCANCAT-PRO is faster than SCANCAT, and it has provision to import "comma delimited" database files and convert them to SCANCAT frequency files. It's $79.95.

Besides SCANCAT controllers, the COPYCAT Terminal Control Program is available for the Universal M-7000 and M-8000 data decoders. And the difficult to find European HOKA CODE-3 decoders are also offered for sale.

For more information, contact Computer Aided Technologies, P.O. Box 18292, Shreveport, LA 71138 (318-636-1234).

PakTERM. Several years ago we described TCOM-777, a specialized terminal program that Bob Lewis, AA4PB, offered for the imported TONO Theta-777 RTTY/AMTOR/CW terminal unit. In case you don't remember it, the Theta-777 was an early Japanese multimode data communications terminal that Amateur-Wholesale Electronics distributed. Though it was an excellent performer, the terminal really needed a specialized program to take the computerese out of operating the Theta-777.

Bob recently let us know that he has completed a new terminal program, PakTERM, designed for the PacComm PacTOR Controller (PTC) working PACTOR/AMTOR/RTTY (which he believes to be the best PacTOR controller on the market). PakTERM, like the earlier TCOM, replaces the controller's command set with a menu-driven system that presents a "human interface" that makes operation easier and friendlier for the user.

PakTERM constantly analyzes PTC status and command responses to take control of the PTC so you're free to concentrate on communicating. PakTERM's core I/O routines are written in assembly language and are fine-tuned to operate at the high speed necessary for smooth operating displays. A 31-page printed and bound user manual comes with the unit.

PakTERM is $30 plus $5 s/h. It's available from Intelligent Software Solutions, P.O. Box 522, Garrisonville, VA 22463-0522; you need to include your callsign and disk size with your order. A two-page, detailed brochure is available from the company if you want more information on PakTERM and its capabilities.

PROCOMM PLUS for Windows 2.0. Since its start as shareware software in the early days of the IBM PC, the DOS-based PROCOMM PLUS has long been the communications program of choice for many amateurs' hamshack PCs. We examined PROCOMM PLUS for Windows 1.0 in last March's column, and we found it to be one of the most powerful, easy to use, and complete packages currently available.

Nevertheless, the updated Windows package, now in Version 2.0, is chock full of new and enhanced features on the drop-down menus and on the user-customizable icon bars. These features, in my opinion, make an upgrade from Version 1.0 a must. The most important of the new features relates to the new FAX options. For the first time in PROCOMM, you can easily send, receive, and manage FAXes, directly from your application programs or through PROCOMM alone (fig. 3).

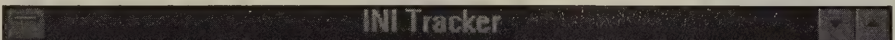
One particularly unique feature is a "FAX-on-demand" capability associated with the program's host mode. This lets others call into your computer and request that specific FAXes be sent back to them. The bottom line is that you may not need either a separate FAX communications program for your PC or a stand-alone FAX machine.

Another improvement lies in the new, fully automated dialing directory. It's now flexible enough (with its sections for modem, FAX, and voice numbers) to be your main phone book. Included is an extended version of ASPECT, a powerful script command language with extensions for the Windows graphical interface.

Among the many other superb enhancements are automatic setup detection and identification of over 700 PC modems; a sophisticated CompuServe script that supports off-line mail reading and message "threading"; WINLINK, a PC-to-PC file transfer script that lets you tag files and directories for easy transfer between desktop PCs, notebooks, and laptops; and a scrollback buffer that handles up to 1300 pages of text and graphics that have scrolled off your screen.

The new version includes a BBS "doorway mode"; a file clipboard that supports Windows 3.1 drag-and-drop capability; full terminal keyboard remapping; and a much improved setup interface. It is, indeed, a very elegant upgrade to an already excellent product.

The PROCOMM PLUS for Windows 2.0 sug-



```
Last Check: 01/25/1994 4:24:27 pm
01/25/1994  4:24:24 pm    Setup Sound Card...
01/25/1994  4:24:04 pm    Deleted Font
 - c:\windows\win.ini
     - 203 [fonts] Arial Super (TrueType)=ARIALS.FOT
 - c:\windows
     + 251 win.ini              11387 1994-01-25 16:23:52
     - 251 win.ini              11422 1994-01-25 16:23:10
 - c:\windows\system
     -  15 arials.fot            1318 1994-01-25 16:23:10
01/25/1994  4:23:37 pm    PC Anywhere Installation...
01/25/1994  4:21:48 pm    Activation Snapshot...
```

The Norton Utilities 8.0 contains a useful suite of Windows configuration utilities—INI Tracker, INI Tuner, INI Editor, INI Advisor, and File Compare. INI Tracker, shown here, is a Windows- and DOS-based tool that recovers damaged DOS and Windows system and configuration files. Photo courtesy Symantec Corp.)

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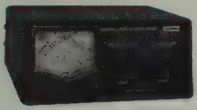
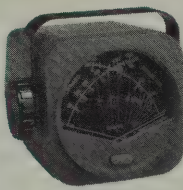
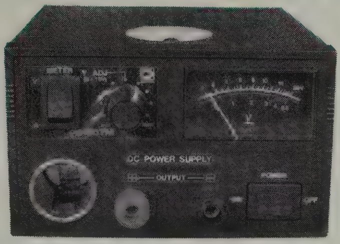
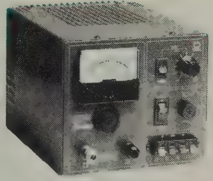
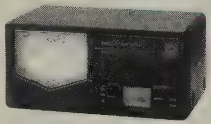

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Current(cont.)	9.2	12	24	32	4.2
Ripple(max.)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	2%
Cooling Fan	NO	NO	NO	YES	NO
Size(inch.)	5x4x9	5x4x9	7x6x9	11x5.5x9	6x3x9
Weight (ilbs.)	11	11	18	22	6
Meter	YES	NO	YES	YES	YES
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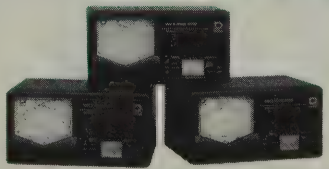

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gested retail price is $179, though it is available widely "on the street" for much less, and upgrades from recent DOS or Windows versions are $69. For more information, contact Datastorm Technologies, Inc., 2401 Lemone Blvd., P.O. Box 1471, Columbia, MO 65205 (314-443-3282).

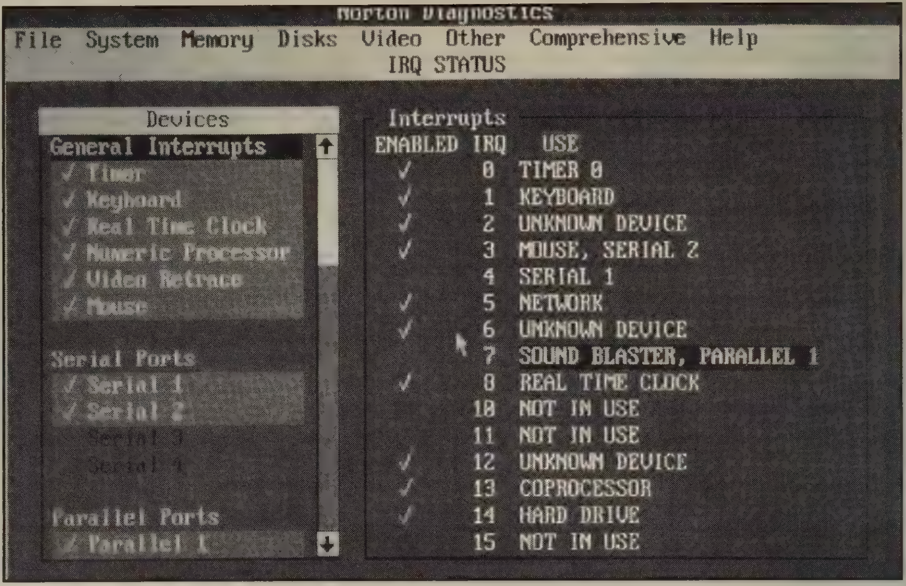
The Norton Utilities® 8.0. Norton has been around for a very long time, since 1982—just a little later than when the first IBM-PC was rolled out. The Norton Utilities 8.0 is a sophisticated, integrated collection of more than 40 tools that offers advanced methods of protecting data, enhancing PC performance, and conducting preventive disk maintenance both under DOS and Windows. Earlier versions almost completely lacked specific Windows support, but the latest incarnation contains all the powerful DOS based disk and file protection utilities, plus significant new Windows-specific tools. Norton 8.0's diverse capabilities are to be found mainly in three areas.

First, there are Windows utilities that provide comprehensive Windows diagnosis, troubleshooting, and repair, including tools to track, edit, and advise on Windows information (INI) files, along with utilities that let you compare files and watch over vital system resources. There also are powerful data recovery features that include an enhanced Disk Doctor® for file diagnostics and repair of even compressed disks and files, an improved File Fix, a disk editor, and an unformat capability.

Finally, Norton offers comprehensive diagnostics and performance utilities for disk optimization, hardware diagnosis, and the reporting of detailed system information. The new version lets you create an auto-loading emergency data recovery disk to recover crashed systems. It also has the ability to accomplish several program functions, such as disk optimization and file system analysis and repair, in the background.

The $179 Norton Utilities ($49 for upgrades) doesn't offer the diversity of features found in PC Tools since Norton is largely dedicated to disk and file maintenance. On the other hand, most jack-of-all-trades products don't quite equal Norton in disk repair and data recovery horsepower.

For more information contact Symantec Corporation, 2500 Broadway, Suite 200, Santa Monica, CA 90404-3063 (1-800-441-7234).



```
Devices                          Interrupts
General Interrupts               ENABLED IRQ   USE
  ✓ Timer                          ✓     0  TIMER 0
  ✓ Keyboard                       ✓     1  KEYBOARD
  ✓ Real Time Clock                ✓     2  UNKNOWN DEVICE
  ✓ Numeric Processor              ✓     3  MOUSE, SERIAL 2
  ✓ Video Retrace                        4  SERIAL 1
  ✓ Mouse                          ✓     5  NETWORK
                                   ✓     6  UNKNOWN DEVICE
Serial Ports                             7  SOUND BLASTER, PARALLEL 1
  ✓ Serial 1                       ✓     8  REAL TIME CLOCK
  ✓ Serial 2                            10  NOT IN USE
    Serial 3                            11  NOT IN USE
    Serial 4                       ✓    12  UNKNOWN DEVICE
                                   ✓    13  COPROCESSOR
Parallel Ports                     ✓    14  HARD DRIVE
  ✓ Parallel 1                          15  NOT IN USE
```

Enhancements to Norton's hardware diagnostics help users protect their information and software assets with advanced testing and certification of vital system components. For example, there's a new interrupt conflict test that identifies the cause of most unexpected lockups and simplifies installing new devices. (Photo courtesy Symantec Corporation)

PC Tools Pro ™ 9.0 for DOS. If you want the broadest range of utilities for your dollar, you're unlikely to find a better value. Because of its multifaceted nature, the $179 PC Tools Pro for DOS ($49 for upgrades) often is called the "Swiss army knife" of PC utilities.

PC Tools Pro for DOS is a powerful group of integrated programs to make computing simpler and faster, and to provide insurance against data loss. Version 9 is integrated in an intuitive graphical desktop that provides access to all applications and files. Included are tools for disk repair, data protection and recovery, disk backup, file management, desktop organization, productivity and performance enhancement, task switching, and virus detection.

One of the most impressive features is the DiskFix™ disk medic. Another is a new hardware diagnostics utility. The diagnostics are part of an enhanced system information program, SI Pro™, that provides data on over 170 local and network parameters. PC Tools also offers excellent alternatives for several entry-level utility programs that Microsoft includes with MS-DOS 6. Compressed drives and drives up to 2GB having more than 50,000 files are supported.

The V9.0 package also has the exclusive CPR work recovery system. CPR takes a snapshot of your PC's RAM at timed intervals, backing it up to an image file on your hard disk, so files that you haven't saved can be recovered after a system crash or power loss. If a crash occurs, you can "roll back the clock" and usually restore an entire session, including multiple applications running under Windows. This rather unique capability can save hours of lost work in such potentially disastrous situations.

Contact Central Point Software, 15220 NW Greenbrier Parkway, #200, Beaverton, OR 97006 (1-800-445-4208).

Wrap-Up

That's all for this time, gang. Next month more "Antennas and Accessories" topics of current interest. See you then.

Overheard: Unfortunately, computer program complexity usually grows until it exceeds the capabilities of the programmer who must maintain it!

73, Karl, W8FX

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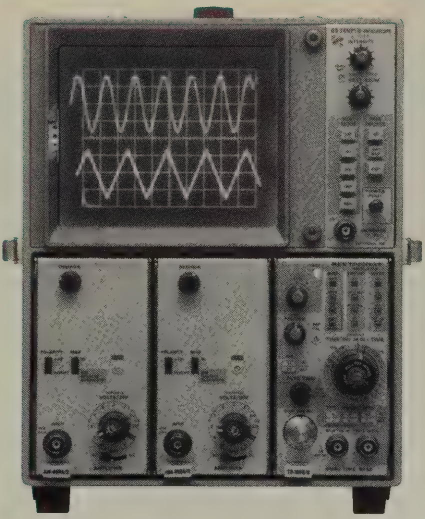

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The Tektronix 7603N Oscilloscope Mainframe

The Tektronix 7603N Oscilloscope Mainframe (OS-245(P)/U) is the most recognizable mainframe in the industry. The three plug-ins offered here are perhaps the most useful for most of the labs in the world. The mainframe itself has a 100 MHz bandwidth so when you want to grow, it's waiting for you. A very bright CRT display will let you to see a single low repetition rate and fast rise time or events, so you're sure to see what you need to. It has a front-panel calibrator output for your own assurance and the professional styling of internal graticules to eliminate parallax errors. Look, with Tektronix, you know the quality is superior, the unit is easy to use, the accuracy is there (and will be), and that this oscilloscope will be dependable for a long time- it always has!

The Tektronix 7A15AN Vertical Plug-Ins

The two Tektronix 7A15AN Vertical Plug-Ins (AM-6565/U) that come with this set are perfect. Vertical sensitivities from 5 mV to 10 V allow you to see a wide range of signals. The AC/DC coupling switch allows you to cut out the DC component of a signal if you wish. They each have a variable GAIN adjustment knob and convenient POSITION knob to give you more control of the display. The 7A15AN has a polarity switch so that you can compare signals while ADD'ing. It also has a MAG switch that lets you magnify the signal 10 times, a user-accessible GAIN calibration adjustment, and a high input impedance, BNC jack that won't alter the operation of the circuitry under test. We give you two 7A15ANs so you'll have the capability of an ideal Comparator! Instead of being limited to reversing the polarity of only one channel, you'll be able to reverse the polarity of either, neither or both. You can also magnify either, neither or both channels at will.

Tektronix 7B53AN Dual Time Base Plug-In

Here is the easy-to-use Tektronix 7B53AN Dual Time Base Plug-In (TD-1085/U). This time base will trigger on signals as fast as 100 MHz and has a variety of ways to sweep: AUTO, normal, single, delayed (with its own triggering control and delayed-time multiplier), intensified, and mixed sweep modes. Sweep speeds are from 50 nS to 5 seconds per division in 25 calibrated steps. Of course, there's a variable sweep control and a signal slope control so you can see the signal just as you like. Other very useful features are the X10 magnification, high and low frequency input filters, internal and external triggers (main AND delayed input jacks), front-panel sweep calibration adjustment, and positioning controls (coarse and fine). When it's not receiving a trigger, the trace on the CRT will brighten to let you know; and when it is triggering an LED lights for you. You can't beat that!

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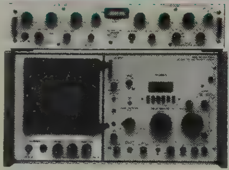

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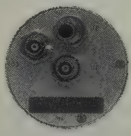

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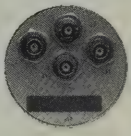
78-108



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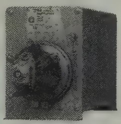

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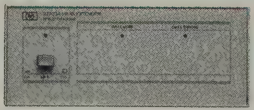
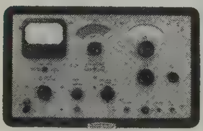


HP-IB Extender

NOW ONLY $150

The 37203A HP-IB Extender overcomes the range limitations imposed by the cabling rules of the Interface Bus and provides high-speed (up to 50 k bytes/second), low-cost extension up to 1000 meters! 37203A's are used in pairs: each Extender serializes the normally parallel HP-IB information and transmits it to the other Extender where it is reconverted back to its original format. The transmission medium can be a single low-cost coaxial cable for both directions of transmission! Supports all HP-IB functions including pass control and parallel poll, electrical isolation plus error detection and correction protects HP-IB from transmission errors. Just think...up to 1000 meters between HP-IB instruments using coaxial cable, unbelievable!



Hewlett-Packard 302A

Wave Analyzer

$250

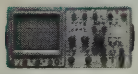
Tucker PRE-OWNED Quality

The HP 302A with its narrow (7 Hz) bandwidth is particularly useful for measuring power-line frequency noise components and narrow-spaced, voice-band signals. Covers the frequency range from 20 Hz to 50 kHz with level ranges from -120 to +50 dB full scale in 15 ranges. Frequency accuracy of ±1%, resolution of 10 Hz. Utilizes built-in AFC circuitry for increased performance.

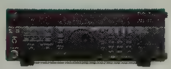
We Take Trades!

Tucker PRE-OWNED Quality

YOUR USED EQUIPMENT IS VALUABLE.



TEST EQUIPMENT WANTED



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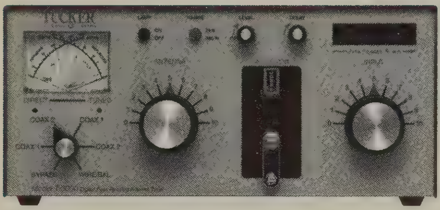
CIRCLE 164 ON READER SERVICE CARD

START YOUR NEW YEAR

INTRODUCING THE TUCKER T-3000...THE FINEST LEGAL LIMIT ANTENNA TUNER MADE!



Tucker T-3000

Legal Limit Antenna Tuner

$399

Tucker SatisfactionPlus 30-Days · No Questions Asked Guarantee

NEW

FedEx. Federal Express *FREE Economy Service available on this item*

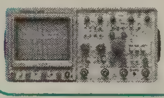
We built the Tucker T-1000 to be the finest 300 W antenna tuner made. You responded by making it the hottest- selling tuner in Amateur Radio! You also told us you wanted to see us develop a legal-limit version of the T-1000...well, here it is!

- Easy, Arc-Free 1.8-30 MHz Operation
- Great Tuning Options
- More Metering
- Superior Materials And Assembly
- Outstanding Customer Support
- One Year Warranty And Our Exclusive Satisfaction Plus Guarantee
- Better Construction, More Value, Tucker Support And Service... The Choice Is Clear The New Tucker T-3000!

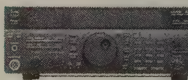
TEST EQUIPMENT WANTED

YOUR USED EQUIPMENT IS VALUABLE.

ALL NEW RADIO EQUIPMENT AVAILABLE



CALL FOR AN INSTANT TRADE QUOTE.



Specifications:

RF Power: 1000 W single tone continuous, 2 kW PEP SSB

Frequency Range: 1.8-30 MHz; continuously variable

Transmitter/Antenna Tuning: Continuous Rotation 4.5 kV capacitors

Inductance: 28 uH roller inductor w/#10 tin-plated wire, Delrin/Teflon body

Antenna Selector: 6 position ceramic coax switch: COAX 1 Tuned and Tuner Bypass, COAX 2 Tuned and Tuner Bypass, Bypass and Balanced Antenna

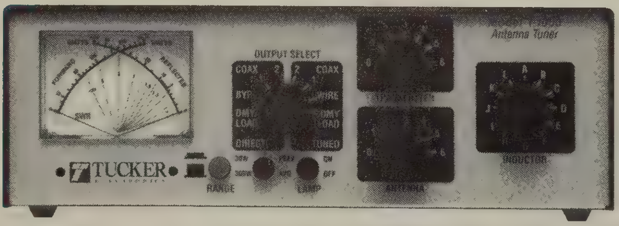
Metering: Cross-Needle SWR/PWR with High and Low (300/3000 W) position, 21 LED Bar-Graph meter for Peak SSB reading

Connectors: Coax 1&2 SO-239 connectors, Bypass SO-239 connector, Balanced Line Dual High Voltage Delrin terminal Posts with 4:1 2.5 kw balun End-Fed Wire High Voltage Delrin Terminal Post

Dimensions: 5.5"(140mm)H x 12.5"(318mm)W x 12"(305mm)D

Weight: 10 lbs. (4.5 kg)

We gladly accept these major credit cards: VISA MasterCard DISCOVER



Tucker T-1000

The Best 300 W Tuner

NEW

Tucker SatisfactionPlus 30-Days · No Questions Asked Guarantee

FedEx. Federal Express *FREE Economy Service available on this item*

Introductory Price: $139.95

This tuner was designed to give you more than any other tuner currently available for 300 W and its construction will let you appreciate its many features for years to come. Comes complete with a 1 year warranty and our risk-free Tucker SatisfactionPlus guarantee. Made in the U.S.A.! Get the best, order your T-1000 today!

RF Power 300 W PEP

Frequency Range 1.8 to 30 MHz

Transmitter/Antenna Tuning Continuous rotation capacitors

Inductance 12-position switched inductor

Antenna Selector Six positions: COAX 1 tuned and DIRECT, COAX 2 tuned and DIRECT, bypass and balanced antenna

Power Switch High and low (300 W/30 W)

Dimensions 10.2" (259 mm) W x 9.4" (239 MM) D x 3.5 (89 mm) H

Weight 3.4 lbs (1.5 kg)

Another Satisfied Customer...

"Nice Tuner. Controls are smooth and I like Lexan panel. Much nicer than the-other-guys."

N. H., Knoxville TN

"Very low SWR on 80-10 long wire! I'm amazed at the ability of the unit for the low price!"

P. K., Chesapeake VA

AEA ALINCO ANLI Antenna ASTRON CORPORATION COMET CREATE cushcraft CORPORATION DAIWA

DRSI EDCO EMOTO HUSTLER hy-gain ICOM JIM PROFESSIONAL

HEIL SOUND Kantronics KENWOOD MFJ pro·am PRODUCTS

WITH ONE OF THESE...

5 Great Reasons To Buy From Tucker Electronics...

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From giving helpful advice and technical support to shipping your order as fast as possible, our more than 100 friendly employees are here to help you. Plus, we have the best return privilege in the business- 30 days to decide if the product is for you- NO ONE CAN MATCH THIS!

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We don't solicit your business on our TOLL-FREE lines and then force you to pay for long-distance charges if you have a question or problem. Tucker customers call one TOLL-FREE line whether ordering, asking advice or needing technical support.

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Not only do we take Amateur Radio Equipment in on trade, but also Test Equipment, Computers, Shortwave Radios and Scanners- we'll trade for any item in our inventory- CALL TODAY FOR A QUOTE!

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In addition to major brands of Amateur Radios, we also carry Shortwave Radios, Scanners, Computers, Test Equipment, our Exclusive Tucker Brand Products and more books, parts and accessories than any other dealer!

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Introducing The New Tucker SWR/Power Meter!

2 Meters You Will Be Proud To Have In Your Shack

Tucker TM-3000UV and TM-3000HF

Cross-Needle SWR/PWR Meters

Your Choice Only $79

NEW

The new Tucker TM-3000UV and TM-3000HF displays forward power, reflected power, and SWR SIMULTANEOUSLY on it's dual movement meter system. They both use a TRUE SHIELDED DIRECTIONAL COUPLER for greater accuracy. 30 and 300 W (UV) and 300/3000 W (HF) scales are selectable from the front-panel. The meters are backlit (AC ADAPTER INCLUDED AT NO CHARGE!) and displays either Peak or Average Power. Construction is first-rate. We use an aluminum case with chemically treated scratch and chip resistance. Our front-panel is reverse-printed lexan that is virtually scratch-proof as well. High quality connectors and screws are used throughout.

Specifications:	**TM-3000UV**	**TM-3000HF**
Power Handling (scale selectable):	30/300 W	300/3000 W
Frequency Range:	100-500 MHz	1.8-60 MHz
	(can be used from 50-650 MHz with reduced accuracy)	
Connectors:	Teflon BNC with gold pins	High Quality SO-239 (input/output)
Power Requirement (AC Adapter included):	9-12 VDC	9-12 VDC
Size (W x D x H):	5.3" x 5.75" x 3.5"	5.3" x 5.75" x 3.5"
Weight:	1.2 lbs	1.2 lbs

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CIRCLE 163 ON READER SERVICE CARD

Tucker TF-144

2m Intermod Filter

ONLY $59

Don't Let Intermod Ruin Your Hamming...

If you are like most us, your 2m radio becomes filled with the squawks and beeps of intermodulation distortion or "intermod" whenever you get close to an urban area. This is caused by the thousands of high-power pagers, FM broadcast stations, cellular sites and other nearby VHF transmissions that overload your 2m receiver's sensitive front end. Most modern transceivers don't have the helical filtering to stop intermod from getting in.

Our Filter Stops Intermod...

Our team of RF engineers have designed a 3 pole filter that will end your intermod problems forever. Our goal was to design the finest, tightest intermod filter available and, after exhaustive testing, we have done so. The TF-144 automatically switches on during receive and attenuates out-of-band signals by as much as 50 dB or more.

Easy To Use...

Simply install the TF-144 in-line between your antenna and the antenna input of your mobile rig or handheld and hook up the attached wire to +12 VDC (it draws only minimum current). We even supply a wire connector for attaching it to your existing 12 V transceiver hookup. The TF-144 takes care of the rest. It automatically switches on during receive and off during transmit. Nothing could be easier!

Year Warranty And Our Exclusive Tucker SatisfactionPlus Guarantee...

The TF-144, like all of our other Tucker Brand Products is built to last. It is designed and manufactured to industrial standards, not the typical "amateur grade" quality found in most amateur radio accessories. Our exclusive SatisfactionPlus Guarantee means you will be more than satisfied with the TF-144's performance- if not, simply send it back within 30 days- NO QUESTIONS ASKED!

Specifications...	
Passband	144-148 MHz (2m Amateur)
Connectors	SO-239
Power Requirement	10-15 VDC less than 100 mA
Dimensions	2.5" x 1.75" x 1.75"

MADE IN USA

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1995-96 Calendars

CQ has done it again with our new 1995 calendar series. You'll refer to your CQ calendar time after time as you search for the schedules of upcoming ham events and conventions. Public holidays and valuable astronomical information will be right by your side, too!

With CQ's 1995 calendars, you actually receive *15 months* of use (January '95 - March '96) with all-new photography you won't see anywhere else. At only $9.95 each, you can't afford to be without them!

1995 Amateur Radio Calendar

There's no better addition to your shack or office!

Imagine professional color photographs of some of the biggest stations in the world! You'll see everything from aerial photos of 80M yagis to ham shacks that are beyond belief! No ham should be without one.

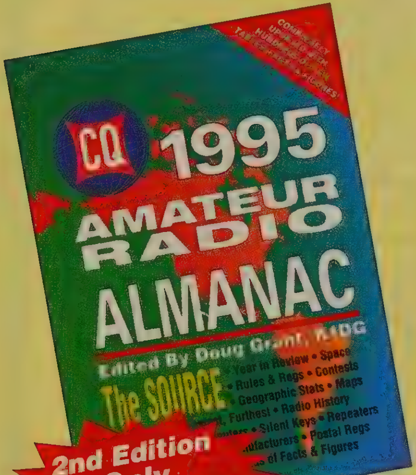
1995 Radio Classics Calendar

If you enjoy the old days of radio you'll love CQ's latest look into the past. Each month you'll explore radio history with dazzling photography of antique radios, rare morse keys, tubes and more.

CQ's 1995 Radio Classics Calendar—a must for every radio nostalgia buff!

CQ's 1995 Amateur Radio Almanac, 2nd Edition

If you're looking for information about ham radio, it's in the **1995 Amateur Radio Almanac**! This Sourcebook is filled with over 500 pages of facts, figures and information.



2nd Edition Only $19.95

Here's just a sample of what's new in this year's edition:

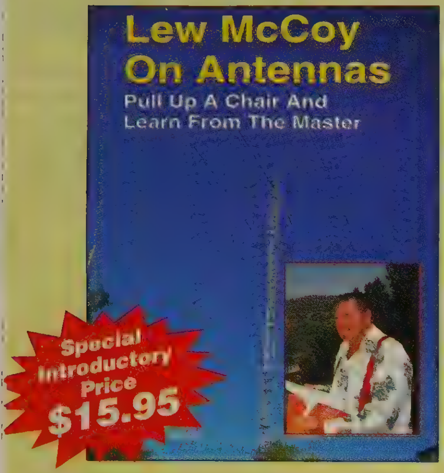
- Amateur Radio Around the World
- Propagation Predictions for 1995
- Latest Part 97 Rules and Regulations
- FCC Survey Listings of RFI-proof Telephones
- Comprehensive Index of Equipment Reviews
- Expanded Coverage of Internet Computer Services for Hams
- FCC General Class Question Pool
- Updated Records for all Major Contests
- Proposed Vanity Callsign Rules
- Revised U.S. Ham Census
- All-new Color Photography
- U.S. Radio Clubs by State & City
- IOTA Program Rules... the list goes on!

Plus, this year's Almanac is even easier-to-use with larger type and a simplified format.

CQ's 1995 Amateur Radio Almanac is a resource you'll refer to over and over again. If it's ham radio, it's in The Source!

from CQ . . . and Just in Time for the Holidays!

Here's the book you've all been waiting for!



Lew McCoy on Antennas

by Lew McCoy, W1ICP

It's not every day you get to meet a living legend, but CQ brings you one of the greatest! CQ magazine author and renowned authority on antenna theory and design, Lew McCoy, W1ICP, has written a truly unique antenna book that's a must for every amateur. Unlike many technical publications, Lew presents his invaluable information in a casual, non-intimidating way.

Reading Lew McCoy is like having a conversation with him right in your shack!

Here's just a few of the topics you'll read about:

- Basic facts about antennas
- Antenna Matching & Standing Wave Ratio
- Understanding Decibels
- Transmatches & Antenna Tuning
- Feedline Radiation Problems
- Simple Wire antennas
- Rotary Dipoles
- Multi-band Rotary Beams & Quads
- VHF Antennas
- Multiband Mobile Antennas

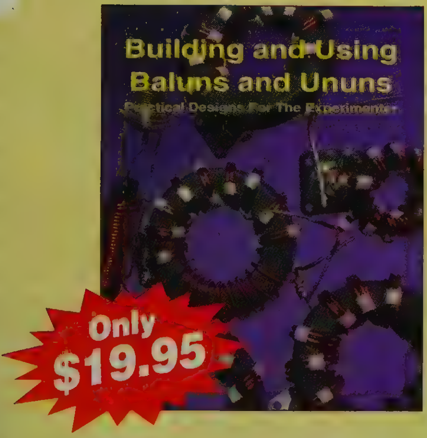
You'll also get countless examples and illustrations. **Lew McCoy on Antennas**—It's not just an antenna handbook, but a wealth of practical antenna advice for the ham!

Pull up a chair and learn from the master. Lew McCoy, W1ICP, an amateur for nearly 50 years, is an expert in his field. For decades, Lew has written and lectured on the subject of antennas to audiences around the world. Now ***you*** can take advantage of all his experience and knowledge. Don't miss out—order your copy of **Lew McCoy on Antennas** today!!

Building and Using Baluns and Ununs

Practical Designs for the Experimenter

by Jerry Sevick, W2FMI



Without question, Jerry Sevick, W2FMI, is *the* authority on transmission line transformer theory. **Building and Using Baluns and Ununs** is the definitive source for his latest practical information and designs.

This book provides a unique opportunity to learn about the application of baluns and ununs for dipoles, yagis, log periodics, beverages, antenna tuners, and countless other examples.

Much has been published about the theory of transmission line matching circuits. Jerry Sevick has unraveled the technological mysteries with designs that are simple and work. Be sure to order your copy of **Building and Using Baluns and Ununs** right away!

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The following are early-bird high-claimed scores. These are raw scores subject to verification.

SINGLE OPERATOR UNITED STATES ALL BAND

NR1E	4,242,780
KF3P	4,197,134
K3ZO	3,924,568
NS0Z	3,692,646
KT3Y	3,244,351
W0CG	2,365,082
K4PQL	2,250,154
AA3B	2,193,510
K7QQ	2,151,492
K7SV	1,974,320
AA6MC	1,965,654
KB9S	1,606,816
KC7V	1,516,516
KA4RRU	1,204,254
NI6T	1,135,277
AD4FX	1,022,630
KC6X	872,235
K3KO	845,688
AA6KX	775,936
W5UDA	628,230
AE0M	619,229

28 MHz

K3UA	16,240

21 MHz

WR3G	162,447
KD4FAZ	54,225
W6BSY	31,872

14 MHz

K2VV	2,246,800
W1WEF	1,659,213
WD8LLD	1,583,016
AD5Q	1,136,394
W6RGG	902,880
K9OM	732,000
N2AA	623,953
WB9HRO	577,408
N6HR/7	276,789
NW6S	272,080

7 MHz

WU3V/5	1,441,300
AC4HB	693,216
K4LTA	414,400
KO0D	403,920
WX9U	303,324
WC7Q	259,128
WV5S	233,688
KO4EW	50,616
W3AP	40,602
KI4XO	35,360

3.5 MHz

W3BGN	355,348
KV8Q	163,200
K2ONP	140,892
W4YDD	13,056

DX ALL BAND

P40W	14,424,410
C48A	8,391,536
PJ8H	5,008,503
S59AA	4,143,482
F6FGZ	3,625,720
RZ9UA	3,609,362
OA4CWR	3,215,784
4N70AV	2,904,552
XL3EJ	2,501,550
EA2IA	2,394,392
LY2IJ	2,378,246
JH5FXP	2,270,916
UX2HO	2,222,430
EU1DX	2,043,510
ZD8Z	2,023,980
EU1AZ	1,847,925
SP6YAQ	1,789,777
AH6MZ	1,787,346
EM0F	1,702,932
UT4UZ	1,684,314

28 MHz

LP4F	485,739
PR5W	104,160
OZ2RH	18,054
VE3HX	8,642
LY2OU	4,320
OM3CPY	2,604
JR0GFM	147

21 MHz

L50D	1,855,567
YZ1AU	893,481
YT9C	641,516
IR3DX	510,756
UT1IA	303,072
Z30B	297,672
VK2AYD	261,193
OM3PA	161,700
YZ7V	137,700
UT7ZT	86,112

14 MHz

VE9ST	3,242,939
S53EA	2,005,146
UF6VM	1,793,616
YU1EXY	1,773,122
YT1R	1,762,660
9A7A	1,747,004
OH6KIT	1,717,408
G3KDB	1,411,438
VX7A	1,301,586
OH2PM	1,237,230

7 MHz

AZ4F	4,608,188
9K2ZZ	3,383,676
S50A	3,302,080
LX/DL1VJ	3,022,600
OM5M	2,643,220
S57AL	2,445,672
9A2OB	2,262,632
S52RD	2,151,072
4N1Z	2,132,964
F5MUX	1,728,012

3.5 MHz

G3LNS	942,240
OK1DXS	916,456
S59KW	910,480
4N1A	875,468
OM5R	784,800
LY6M	718,390
OM7M	678,834
YT0T	653,910
XL7CC	621,712
SP7GIQ	563,248

1.8 MHz

LY3BU	132,112
UY5BA	101,880
US7ZM	74,710
XL7SV	20,592

ASSISTED UNITED STATES

K3WW	1,688,400
KN6M	1,552,692
KM0L	1,016,736
K1JKS	989,298
KT6V	909,954
KC1F	526,884
KA5W	445,538
AD6E	432,900
WF5E	377,060
W6OAT	193,648

DX

DK3GI	2,539,902
ED1WPX	1,763,069
YT1AD	1,547,891
EA4KA	990,040
IK0HBN	631,442
G3XMZ	348,226
G5LP	347,802
IK3SCB	164,892
DL4KMK	48,106
DJ3WE	20,340

LOW POWER SINGLE OPERATOR ALL BAND UNITED STATES

AC1O	1,470,980
K2QMF	1,058,851
AB6FO	1,016,706
WS8O	784,512
N4YDU	602,370
NA1R	538,475
K7GM	431,400
K3TLX	415,944
KB8N/5	392,784
KN4QV	362,912

28 MHz

N5NMX	6,586
WA3CGE	2,312

21 MHz

NT5D	44,460
W2CRS	23,120
KU6T	1,596

14 MHz

WA6KUI/4	458,652
WA7FAB	432,368
W7QN	143,040
WN3K	126,616
NJ3K	103,912
W7HS	103,840
N8II	103,740
W8BLA	62,130
AE2N	32,034
AA8CH	11,990

7 MHz

KJ0B	90,240
AA7FK	74,580
W3CPB	71,446

3.5 MHz

KE2ZU	79,344
NV3V	7,800

1.8 MHz

AA9AX	2,700
N6WLX/8	476

DX ALL BAND

C6AHY	4,712,408
NP4Z	4,162,368
VP2EJ	4,128,536
6Y7M	2,581,695
9V1YC	2,170,108
HA8FM	2,099,041
KP4VA	1,982,970
6W1/F5PHW	1,702,019
EA5WU	1,671,444
RA3AUU	1,594,320

28 MHz

L7DX	296,172
HA8ZO	16,450
S59ZZ	15,360
PY2DUN	4,840
UA6FJ	3,692
YU70RA	3,560
ON4ZD	1,792
RA6LW	1,120
DF5WN	1,120
KH0/JO1CRA	864

21 MHz

LU4FD	628,125
RW6HZ	386,451
IR9AF	376,720
EA8ADJ	363,394
LU3FSP	315,480
EA7ADH	93,068
VK4XA	67,828
SP5DIR	52,325
OH3MEO	51,824
UX0HA	50,562

14 MHz

3G1X	1,923,112
HA8RH	763,078
S58WW	553,570
XL4VV	534,060
XL6BF	453,792
LY3ID	399,567
4F3AAL	299,097
4X4ZT	234,522
SP9XCN	230,124
PA3ELD	216,968

7 MHz

EA8CN	1,197,700
S54A	996,588
EA9UG	789,786
PA3AAV	673,002
OK1FMR	650,624
TA2BD	576,752
T91DNO	526,768
EA8NQ	520,870
US4EX	406,752
RA3PZ	312,400

3.5 MHz

S50C	379,050
HA4FV	298,848
UX2MF	245,025
UR3IEW	179,080
RA3XA	136,952
OK2HI	136,476
OM5Z	123,134
G4ZOB	108,086
ER3ED	107,672
HA8FW	102,204

1.8 MHz

S57DX	104,920
DL5MHB	34,428
RV1CC	29,120
RA4UDW	20,648
RA3RAQ	17,290
ON4AUC	10,368
YL2GQT	10,140
OM3TYM	6,608
IO0KHP	4,042

MULTI-OPERATOR SINGLE TRANSMITTER UNITED STATES

WC4E	3,193,032
AG6D	2,851,157
WX3W	2,824,448
N5GM	2,789,775
N5OK	1,577,124
WO1N	1,455,264
AA0NC	591,375

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LY7A	5,677,200
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UX8IX	A	618,162
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JA6GCE	A	361,179
SP5YQ	A	226,863
LU1FNH	28	2,523
UY3CC	21	99,897
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SP4GFG	14	94,802
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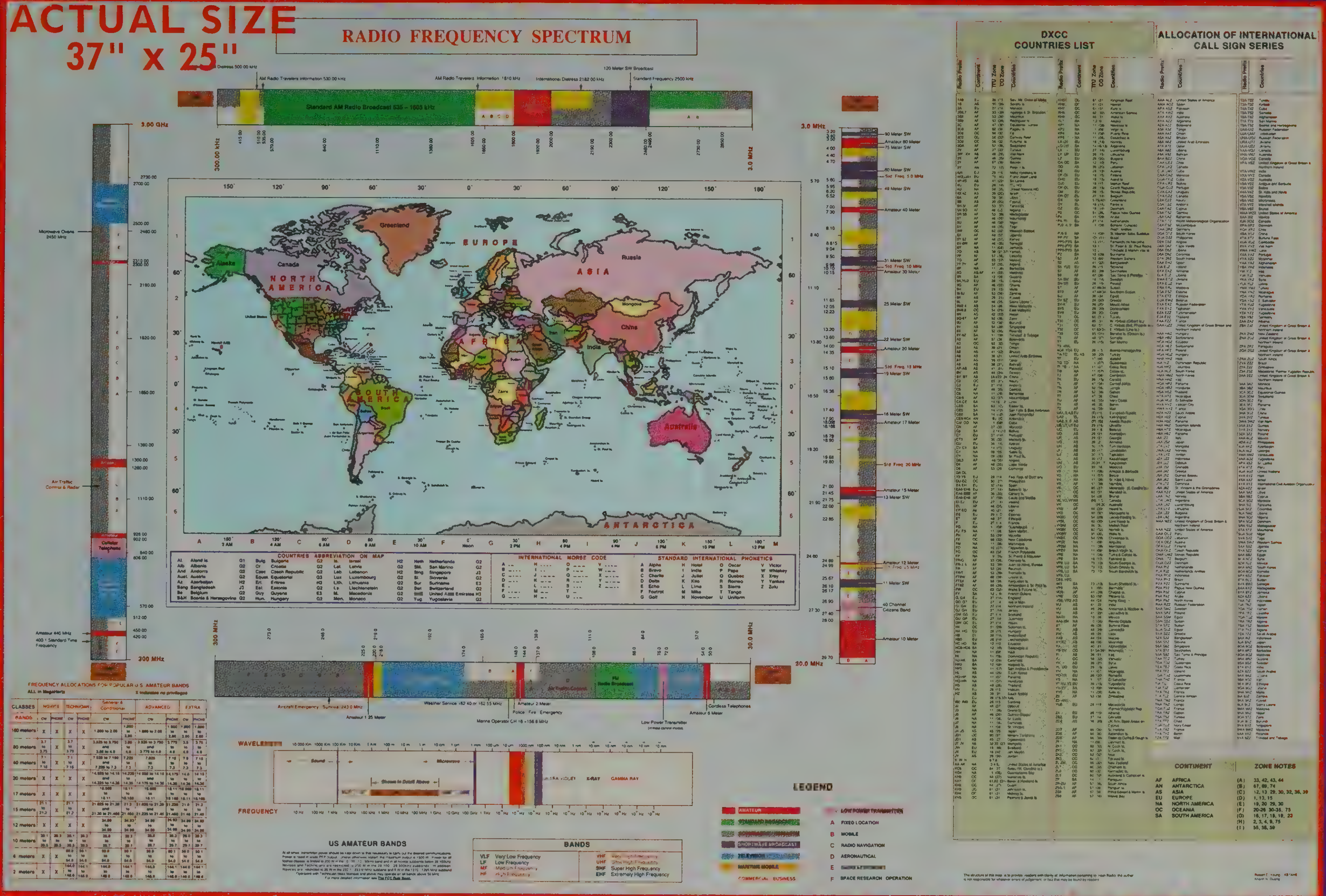

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Radio FUNdamentals

BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

Confessions of a Radio Fiend

CQ's modest beginning in 1945 took me back in memory to my own modest start in amateur radio, a long time ago.

I was probably less than six years old when my father brought home a "radio music box." I didn't know then what it was. I now know it was a Radiola IIIA, complete with a black horn speaker, numerous dry batteries, a wet battery, and a battery charger. This was great stuff. I eventually learned to turn on the radio when my parents were absent. It was an awesome experience to twist the controls and hear people talking, and even hear music and singing!

Excited by this experience, I decided to learn all about radio. My first experiment was to look down into the black horn of the Radiola set to see if little men were playing music inside of it. No little men there. Were they in the radio box? Or perhaps inside the bulbs jutting out of the box? No little men there, either.

A more systematic search was called for. The horn speaker was taken apart, the tubes removed from the receiver, and the front panel taken off. Varous parts were unscrewed and wires removed. Still no little people could be found. What was going on?

The Crystal Set

I admit my Dad viewed my experiments with a kindly eye. Besides, he was ready to junk the Radiola and buy a spiffy Eagle 5-tube Neutrodyne with a bigger speaker. This complicated device had *three* tuning dials! Three times as much fun! And I found out that if I set all the main dials near zero, I could hear fellas talking back and forth to each other. One of the fellas, in fact, seemed to be very close, possibly in town.

Dad and Mom wanted to listen to the Eagle, not perform experiments with it, so the very next Christmas I found a Philmore crystal set and a pair of genuine Brandes earphones under the tree! The crystal set had a tapped coil, and I could clearly hear three or more fellas talking back and forth. Who were they? Was I eavesdropping on local telephone calls? My dad said no, the fellas I heard were "radio hams."

Radio hams? I talked to my friends and we figured it out: Fellas like us could talk on the radio if we just knew how to do it! It was obvious that a transmitter was needed, and some call letters. Perhaps a transmitting antenna. After all, an antenna was needed with a receiver, so why not an antenna for a transmitter?

Two Years Later

My pals and I were a lot smarter now. I had actually built a two-tube receiver that heard amateurs and radio signals from foreign countries! I could hear code signals, some of them from ships, others from amateurs. I found *Shortwave Craft* magazine at the local magazine store and virtually memorized each issue. All of us built code practice oscillators and spent hours of spare time practicing sending code to each other. I inked the code on one side of a set of flash cards (the appropriate letter was on the other side). I carried the cards with me and persuaded my family (and reluctant friends) to flash the cards, and I would identify the letter in question. I was becoming pretty good at sending code, too.

Just in case I ever got my amateur radio ticket, I built a one-tube transmitter using a 201A tube powered by 90 volts of defunct batteries. I knew it worked, because I could light a flashlight bulb on a loop of wire if I held it near the transmitter coil. Now all I needed was a good transmitting antenna.

The Black Eye

A nifty place to erect a transmitting antenna was from my second-story bedroom window out to an old tree at the back of the lot. It was nearly 100 feet away. Attaching the antenna to the house took but a moment on one warm spring day. I reeled the wire out across the yard and climbed up into the tree with a length of clothesline to make a tie-off point.

I arrived up at a large vee in the tree where I could stand comfortably, about 25 feet above the ground. This seemed to be a good place to hook the antenna.

I happened to glance to the right into the next-door neighbor's yard. There was his daughter lying on a blanket taking a sunbath! Starkers! Holy Smoke! I nearly fell out of the tree! I must have made a slight noise, as she unshaded her eyes, saw me, and grabbed the blanket, running for the house, yelling that she would "fix me!" when she caught me. (She was about five years older than I was.) She caught me for sure next day on the way to school and planted a hard fist in my face. I concluded that I would have to be more circumspect when I attempted again to hook my skywire in the tree.

On The Air!

I practiced the code and diligently read the ARRL booklet "How to Become a Radio Amateur." Eventually I purchased a *Handbook* for a dollar and concluded I was now pretty smart, especially after I had read the two books about radio in the public library.

The lure of getting on the air was a powerful force, and I eventually hooked my 201A transmitter to my trusty antenna. The little rig completely blocked my two-tube receiver, so I had to call a nearby friend to listen to my signal and tell me where I was on the dial. Alas, he couldn't hear me! A frantic call to a fella down the street who had a one-tube set proved I was getting out. He could hear me if he put on his earphones and put his head under a pillow to cut out extraneous noise. Since our neighborhood was rather quiet, this was not an auspicious beginning. To date, my DX record was about 200 feet.

The Big Day!

It was a blustery spring Tuesday with intermittent snow flurries. I skipped school, walked to the trolley line, and rode into town. Another walk (it was really snowing now) to the train and a ride into New York City followed. I transferred to the subway and went downtown to the Federal Building, a grim, hulking building holding the Federal Radio Commission and other mysterious government offices. It was half-hidden by the snow storm.

Up the elevator to the Commission rooms I went. I walked into a super-heated area, tastefully done in dark, stained wood, that seemed to resemble a waiting room in a morgue. It was stifling. There were about ten fellas milling around some desks, each of which had a telegraph key attached. I picked a desk near an open window to get some cool air. The snowstorm had stopped and the sun was out

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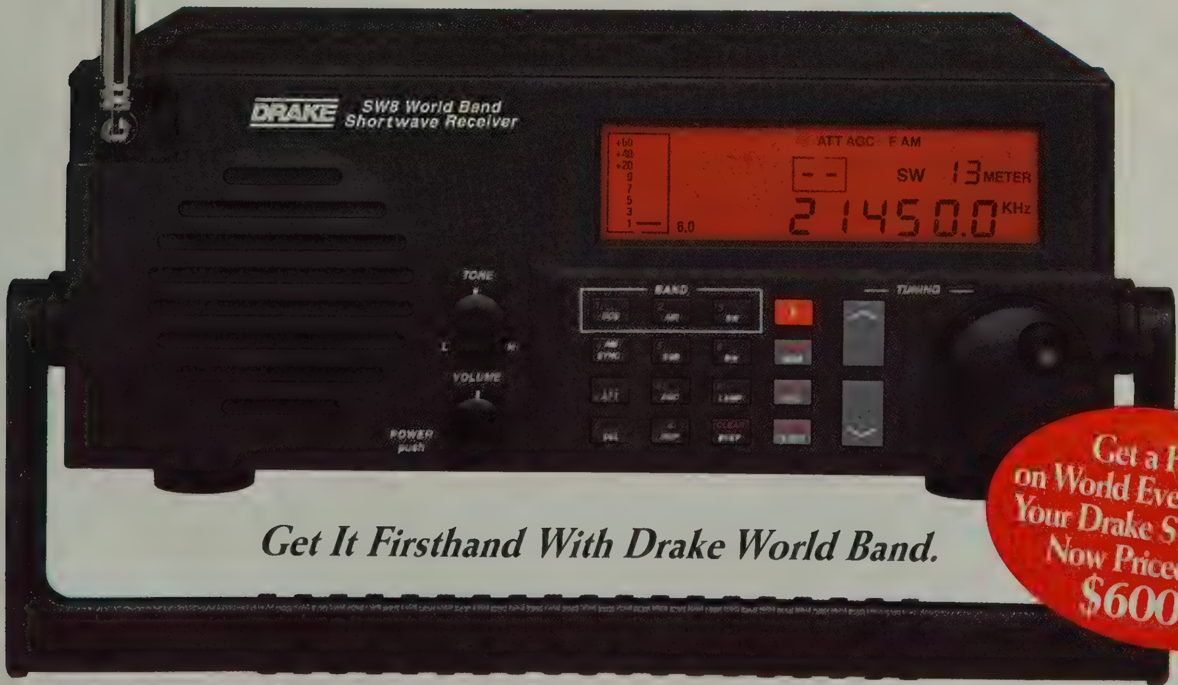

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now. Surely that was an auspicious sign!

The Radio Inspector (R.I.) entered, and I was pleased to see that he resembled a human being. He introduced himself, and then asked each would-be amateur to send a bit of code to him using the key on the desk. All the keys were attached to a code oscillator, and the Radio Inspector listened to each applicant in turn, headphones dangling around his neck.

Two of the fellas washed out. They picked up their jackets and mornfully left the room. The Inspector told the rest of us that we would now take the dreaded code examination at 10 words per minute. He would send us straight text for five minutes and we would have to copy at least one minute with no errors. Five errors, a minute apart, and you were out the door!

The Code Test

I was very nervous, but I had been practicing code up to 12 or 13 words per minute. Perhaps I would be okay. The Inspector started the tape machine and suggested we listen to it for a short time in order to become familiar with the sound. He would tell us when to start copying.

So far, so good. I listened and realized I would have no trouble writing down the stuff. I had taken my jacket off, and the incoming breeze through the window felt good. I could look out the window and see the other buildings and birds circling in the sky.

The Inspector stood up in front of us and said the five minute period would start in five seconds. Start copying!

I grabbed my pencil and started to write. It was simple English text interspersed with numbers. Not bad at all.

I had copied for about two minutes when there was a loud flurry of wings and one of New York's infamous pigeons landed on the window ledge in the little layer of snow. He looked at me with a beady eye, made a loud squawk, and jumped through the window right onto the paper I was using to copy code! I recoiled and made an attempt to brush the pigeon away. The fellas on each side of me quickly looked up and instantly went back to copying code. I flailed away at the pigeon, who made another squawk, and fluttered out the window, after depositing a large, brown, unpleasant mass right in the middle of my code paper.

I had missed about a minute of code! I was so flustered that I don't think I knew my own name. I started to write what I thought I was hearing, but it was no use. I was all bollixed up. Finally, I got my wits together and started copying the stuff—and it abruptly stopped! The code session was over.

Later I found out the R.I. had observed the whole charade and found it hilarious. I felt very depressed, that's for sure. We handed in our papers, and the R.I.'s assistant told us to hang around. They would be graded right away, and then the written portion of the exam would be given.

After an interminable wait, the results were announced. About half the applicants had passed the receiving test and I was one of them! I felt wonderful. Now the written portion of the test would be easy. I was loaded for bear!

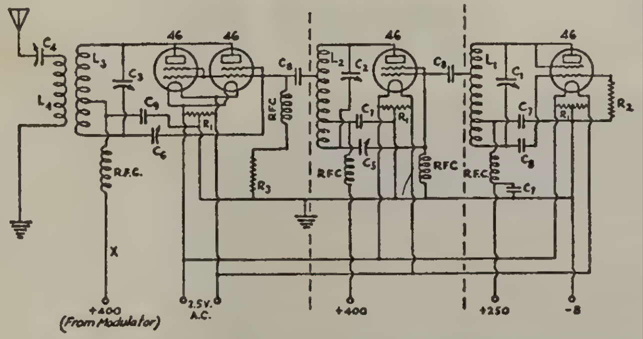
On the Air (Legitimately)!

The days dragged by and I received no word from the R.I. Did I actually flunk the written exam? Each day I raced to the mailbox—no license. Finally, after about three weeks of agony a small envelope arrived from the Commission. In it was the prized license! I was now a radio amateur! One of my buddies was not so lucky. His license was lost in the mail, and it took over six months of worry, letter writing, and trips to the Federal Building to get a replacement ticket. Fortune had smiled on me.

Now that I had my ticket, I was hot to trot. I decided I would either get on 20 meter CW or 160 meter phone. Lots of listening time convinced me I would get more local help from the 160 meter gang, many of whom were school kids about my age.

I was sidetracked in my transmitter construction by an article in *QST* describing a simple 160 meter phone rig that only had three tubes in the RF section and one tube as a modulator. It was a grid-modulated affair and ran about 16 watts input. Little did I realize that the modulated output was only about 4 watts! Once I had built this little monster I found I was talking to myself. I only managed to work two stations over a two week period. My log was full of unsuccessful calls. The trans-

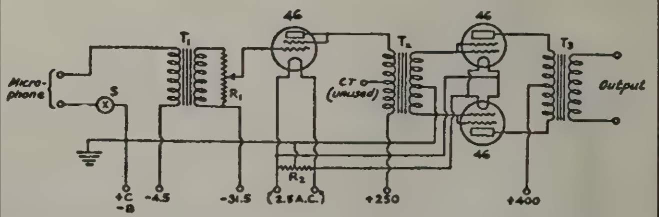
Fig. 1- RF section of "46 job."



— WIRING DIAGRAM OF THE RADIO-FREQUENCY END

C_1 — 500-μμfd. variable condenser.
C_2, C_3, C_4 — 250-μμfd. variable condensers.
C_5 — 100-μμfd. midget condenser.
C_6 — 50-μμfd. midget condenser.
C_7 — 005-μfd. fixed condensers.
C_8 — 250-μμfd. fixed condensers.
C_9 — 001-μfd. fixed condenser.
R_1 — 20-ohm center-tapped resistor.
R_2 — 50,000-ohm, 1-watt resistor.
R_3 — 1000-ohm, 2-watt resistor.
RFC — Radio-frequency chokes, Silver-Marshall Type 275 or equivalent.
L_1 — 17 turns of No. 12 enamelled wire, spaced to occupy 2½ inches on 2½-inch diameter form, tapped at 5th turn from grid end. Buffer excitation tap at 10th turn from plate end.
L_2 — Plate portion: 30 turns No. 18 enamelled, spaced to occupy 1½ inches on 2½-inch diameter form, tapped at 23rd turn from plate end for excitation to following stage. Neutralizing portion: 12 turns same spaced to occupy ¾-inch on same form, ½-inch away from plate portion.
L_3 — 38 turns of No. 14 enamelled wire, spaced to occupy 3½ inches on 2½-inch diameter form, tapped at center.
L_4 — 30 turns of No. 18 enamelled wire on 1½-inch diameter form; no spacing between turns.
Key or keying relay may be placed at X for c.w. transmission.

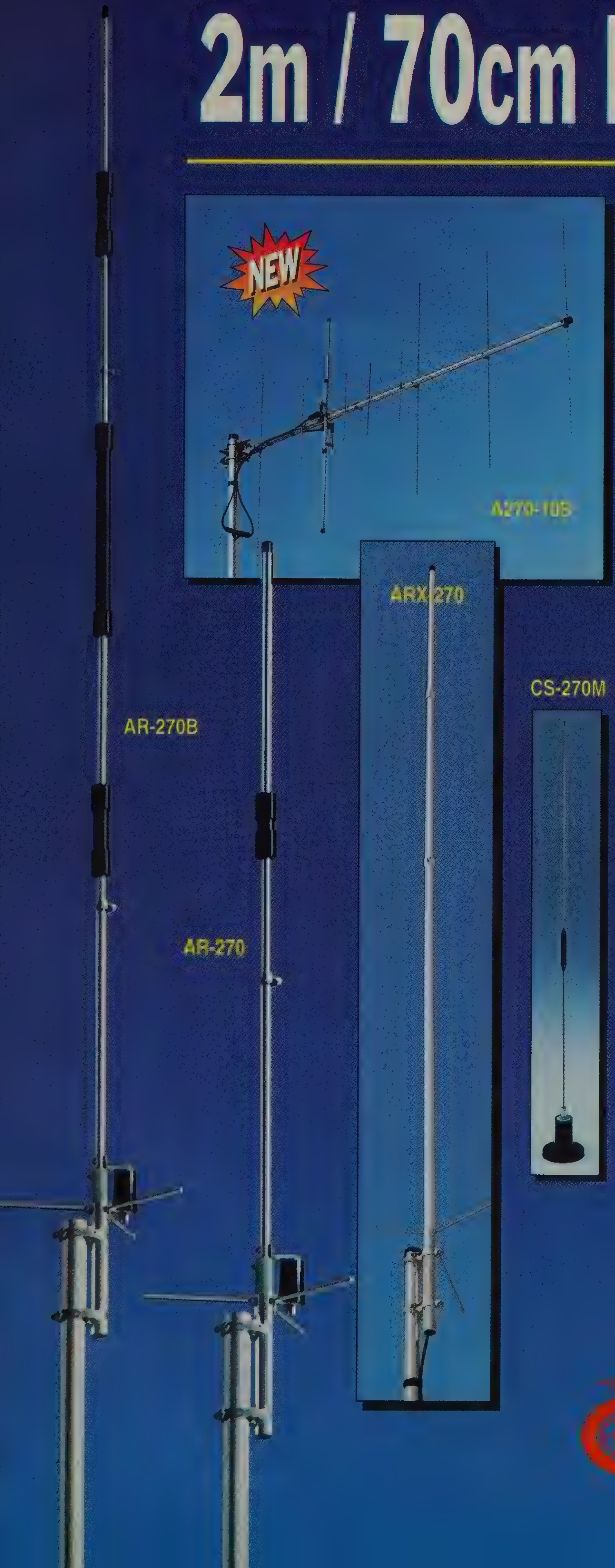
Fig. 2- Audio and modulator section of "46 job."



— WIRING DIAGRAM OF THE CLASS B MODULATOR

T_1 — Single-button microphone transformer.
T_2 — Class B input transformer; turns ratio, total primary to total secondary, 1 to 1.
T_3 — Class B output transformer; if secondary is not tapped the turns ratio from total primary to secondary should be 1 to 0.79.
R_1 — 500,000-ohm potentiometer.
R_2 — 20-ohm center-tapped resistor.
S — Single-pole single-throw switch.

2m / 70cm Dual Banders



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MODEL	A270-10S	
Frequency, MHz	144-148	430-450
Forward Gain, dBd	10	10
No. Elements	5	5
Front to Back Ratio, dB	20	18
SWR 1.2:1 Typical		
2:1 Bandwidth, MHz	≥4	≥10
Power Rating, Watts PEP	350	350
3dB Beamwidth, Degrees		
E Plane	52	52
H Plane	60	60
Boom Length, ft (m)	6.17 (1.9)	
Longest Element, in (cm)	40.3 (102.4)	
Turning Radius, ft (m)	6 (1.8)	
Mast Size Range, in (cm)	1.25-2 (3.2-5.1)	
Wind Load, ft^2 (m^2)	.725 (.07)	
Weight, lb (kg)	1.8 (.81)	

MODEL	AR-270		AR-270B		ARX-270U/N	
Frequency, MHz	144-148 / 430-450		144-148 / 430-450		144-148 / 430-450	
Gain, dB	3.7	5.5	5.5	7.5	9	12
SWR 1.2:1 Typical						
2:1 Bandwidth, MHz	>4	>15	>4	>15	>4	>20
Power, Watts FM	250	250	250	250	200	200
Horizontal Radiation Pattern, Degrees	360	360	360	360	360	360
Height, ft, (m)	3.75 (1.13)		7.7 (2.3)		16.5 (5)	
Mast Size Range, in	1.25-2 (3.2-5.1)		1.25-2 (3.2-5.1)		1.25-2 (3.2-5.1)	
Radial Length, in (cm)	6.75 (17.1)		20 (51)		20.5 (52.1)	
Wind Load, ft2 (m2)	0.27 (0.03)		0.47 (0.044)		0.95 (0.088)	
Weight, lb (kg)	2 (0.9)		2.4 (1.09)		5 (2.3)	
Construction style	High strength aluminum		High strength aluminum		Fiberglass enclosure	

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mitter was soon taken apart and the components relegated back to the junk box.

The "46 Job"

Plenty of listening revealed that most 160 meter amateurs had a transmitter mysteriously described as a "46 job." They sounded great, and I longed to build this superior transmitter. One day somebody referred to the July and August 1934 issues of *QST* for the whole story on the "46 job." Alas, the issues had come and gone. Luckily I found them in the file at the local library and spent several hours painstakingly copying the circuit and construction data from the magazines.

An inventory of the junk box showed that I had a lot of the parts on hand, resurrected from old, defunct battery receivers. The transmitter ran about 40 watts input and had class-B modulation (figs. 1 and 2). Two special audio transformers and two power-supply transformers were required. I had to buy these, plus some RF chokes and seven type 46 tubes. I had been warned that only National Union brand tubes would work, and to stay away from RCA tubes, as they would not work. (I never found out what this old wive's tale was about.) I compromised and bought seven unmarked tubes on "radio row" for 15 cents apiece. They worked fine.

Mindful of the catastrophic result of my first antenna work, I was very careful when I boosted the far end of my sky-wire up another 2 feet in the air. As far as I knew, no one saw me. The combination of a 40 watt rig and a good Marconi antenna worked wonders. Now I was on the air with the rest of the fellas, and in my spare time I could study for my Class A license. I would be eligible for that after one year from the time my original ticket was issued. That would give me plenty of time to plan my 20 meter phone/CW transmitter. But that's another story!

The LPDA Revisited

The story is told that at the end of World War II a reporter, dazzled by revelations of radar, sonar, jet planes, and the atomic bomb, asked General Eisenhower which instruments of war were the most important in contributing to the Allied victory. Eisenhower responded that in his opinion the bulldozer, the 2½ ton truck, and the C47 transport plane were the tools that won the war.

I was reminded of that story during a lunchtime discussion about HF antennas with Hank, W6GXN. We concluded that the three most important steps in antenna evolution were the Marconi, the Yagi, and the Log-Periodic array.

The reasons for these choices were that the Marconi antenna illustrated that the earth played an inportant role in the function of the antenna and, in fact, could substitute for half of the classic dipole antenna. The Yagi was a milestone in that it made use of parasitically excited elements to fashion a directional array. And finally, the log-periodic antenna design provided a truly simple broadband antenna that would work over an octave or more, providing signal gain and preservation of the pattern.

I discussed a minimum-size log-periodic dipole array in my last column. This drew appreciable mail, some suggesting that I had sold the LPDA short, discussing a only simple design that didn't provide much bang for the buck. The design in question provided about 3 to 4 dBd gain and 6 to 10 dB front-to-back ratio over the range of 18 to 28 MHz. This was accomplished on a 10 foot boom. The virtue of the antenna was the small size; the price paid was the pallid performance. (This design is shown in the 16th and 17th editions of the *ARRL Antenna Book*.)

For some years the LPDA was thought to have performance equal to a Yagi, size for size. However, the gain figure of the LPDA was modified about eight years ago by a correction in the design constants. The correct gain of the LPDA turned out to be as much as 1.4 dB less than originally stated.

The gain of the LPDA for a given frequency range depends upon the chosen boom length, which affects the number of elements and the included apex angle of the design. The more elements, the higher the gain and the smoother the "ripple" in characteristics across the passband.

Paul, W6PYK, who is an acknowledged expert on LPDA antennas (see his article in the December 1979 issue of *Ham Radio* magazine), points out that doubling the number of elements from five to ten increases boom length to 24 feet. An additional power gain of 1.4 dB is achieved, bringing the overall gain to about 4.4 to 5.4 dBd. This is approximately equivalent to the gain of a spot-frequency two-element Yagi on a 0.12 wavelength boom. Doubling the length again to 48 feet doubles the number of elements again and adds another approximate power gain of 1.4 dB. Gain is now in the range of 5.8 to 6.8 dBd. This is roughly equivalent to the gain of a three-element Yagi on a 0.3 wavelength boom. This is about 20 feet on 14 MHz. Thus, on the lowest operating frequency the LPDA antenna is roughly two and one-half times as long as an equivalent Yagi, as far as power gain goes. The extra length of the LPDA, of course, accounts for the elements required for operation over the extended operating range.

You can fudge the design of the LPDA to shorten boom length, but remember, there's no free lunch! 73, Bill, W6SAI

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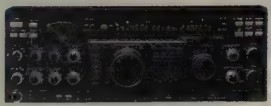

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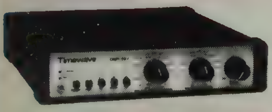

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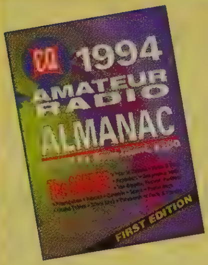

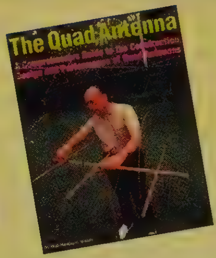
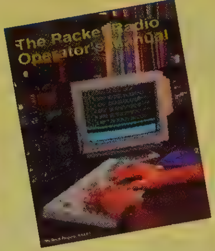
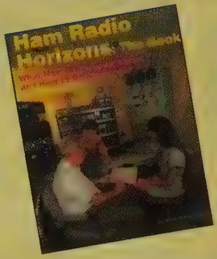

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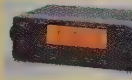
ALINCO ELECTRONICS INC. KENWOOD ICOM

NEW DJ-582T

This tiny dual bander now has an improved scan rate, larger keypad buttons and a transmit LED. The same great ergonomic design features CTCSS, DTMF, great audio and excellent sensitivity.

$\$389^{95}$

DR-M06T NEW



New propagation modes and new contacts are yours on the 6 meter band with this new mobile from Alinco. It offers FM performance with 100 memories, handles unique splits, tone encode, time out timer and more.

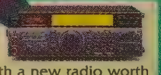
$\$369^{95}$

NEW TH-79A

This slim line dual bander sports a dot-matrix LCD (for a perfect Alpha numeric display), 82 memories, non-volatile memory with ID, DTSS, DTMF & CTCSS V/V & U/U receive & "FET" power make this a winner.

$\$494^{95}$

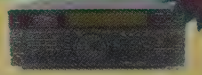
NEW IC-738



Icom does it again with a new radio worth the word "Great" utilizing DDS technology, 1 Hz of tuning resolution is displayed with VOX, RF gain, 100 watt 100% duty cycle, 101 memories, quick split auto antenna tuning with step function, dual CW ports and more stack up to a feature packed HF rig.

$\$1549^{95}$

IC-736 NE

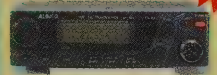


Here's the H.F. rig you've been holding out for! It features a full 100 watts output from 160 meters through 6 meters with a built in antenna tuner and power supply, VOX, PBT, RF Gain, 101 memories and more provides you with the latest features and fun.

$\$1919^{95}$

DR-130T

SAVE $15 MORE*

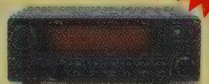


This 2 meter mobile sports all the features you need in this class transceiver. Power out is 50 watts with DTMF mic, CTCSS encode, bracket, hardware and power cord gets you set to go into a tight space.

$\$319^{95}$

DR-600T

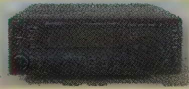
SAVE $10 MORE



This easy to use dual bander is jam packed with special features like simultaneous dual band receive, detachable front panel, remote operation and much, much more.

$\$589^{95}$

TS-50S

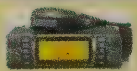


Enjoy high performance communications plus go-anywhere convenience with the world's smallest 100w mobile HF transceiver. All modes and all bands complete this package.

- **Limited supplies**

$\$1059^{95}$

IC-2340H



This new 2 meter/440 MHz dual band is another star in a new product line up for Icom. Features include separate tuning, volume and squelch controls for each band, 100 memories, and high power output to make this competitively priced unit a real winner.

$\$599^{95}$

IC-820H

This new satellite dual band all mode base is designed to provide critical performance with Icom technology. Competitively priced. Features include data port, 50 memories, TXCO, noise blanker, DDS, compact size and much much more.

$\$1629^{95}$

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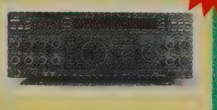
Hello Minnesota!
Hear us on KKCM 1530 AM
Saturdays, 10:00am-11:00am
Starting January 7, 1995

YAESU

FT-1000D

SAVE $100 MORE



Fun's fun, but you can be very serious with this heavy duty competitor. Dual receivers, 200 watt output, 99 memories and 108 dB dynamic range gives you the performance edge.

$\$4109^{95}$

FT-900AT

The FT-900/AT is a revolutionary HF transceiver which answers the call for a truly practical mobile radio. Its unique remote-head construction allows installation where no other transceiver can be mounted. 100 watts, 100 memories, dual VFO's, IF Notch and many more features.

$\$1349^{95}$

FT-5100

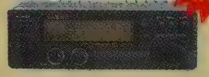
SAVE $50 MORE

This dual band mobile features 100 memories, cross band repeat, lighted keypad, built-in duplexer and a small footprint. Dual watch capability rounds out this 50/35 watt VHF/UHF transceiver. Packet ready.

$\$619^{95}$

FT-2500M

SAVE $30 MORE



This new 2 meter mobile borrows its ruggedness from the FT-2400H while adding great new features such as advance track tuning, time out timer, A.P.O., 9600 bps option, 31 memories, the new "omni-glow" LCD display and more!

$\$359^{95}$

FT-51R/31 NE

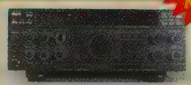
This new H.T. is the world's smallest dual bander. FET output, back lit keypad, V+V, U+U and U+V operating modes plus–menu guide, *Spectrascope*™, CTCSS encode, DTMF paging, 120 memories, cloning, SLS (ask) and so much more you have to hold and try it!

- **FT-51/38** $\$509^{95}$

$\$489^{95}$

FT-990

SAVE $100 MORE

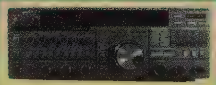


The new FT-990 combines the basic technical features of that top-of-the-line model with several new advances in both transmitter and receiver circuitry. Digital filter, 90 memories, wide dynamic range and much more!

- **FT-990DC** $\$1819^{95}$

$\$2119^{95}$

FT-736R



Satellite and all-mode 2m/70cm work gets exciting with this full-feature transceiver. Linked tuning, 12 unlink memories, 100 memories, and 2 optional modules offers band extensions for 6m, 220MHz, or 1.2 GHz operation.

$\$1819^{95}$

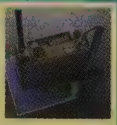
FT-840

SAVE $50 MORE

This new transceiver delivers the fun and performance you're looking for while staying on a budget! It has 100 watt output, 100 memories, DDS, IF Shift FET front end and a general coverage receiver.

$\$869^{95}$

FT-290R/II



Portable or mobile, this 2 meter all-mode transceiver delivers fun and function. The 25 watt linear amplifier clips on in place of an optional battery case to extend your operating horizon.

• **FT-690**	6m Txcr	$\$689^{95}$
• **FT-790**	70 cm Txcr	$\$679^{95}$

$\$579^{95}$

FT-530

SAV $50

The newest member of the dual band family. This handheld sports auto tone search, 82 memory channels, automatic power off, built-in VOX, dual in-band receive feature, built-in cross band repeat function and much more.

- **Limited to SOH**

$\$465^{95}$
$-\$50^{00}$

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We offer factory authorized warranty service for Icom, Kenwood and Yaesu. We service all makes and models. Our customers may send any product requiring service to us, and we will handle it for them. This is a one-stop service that keeps our customers having more fun than hassle in this hobby. If you need a custom cable for packet and don't have time to make it, let us do it for you. C.A.P. & M.A.R.S. mods are also available at reasonable rates to authorized hams only.

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Superior Intermod Rejection!

STANDARD PIONEERS ANOTHER FIRST!! THE C5718DA & C1208DA IS PACKET READY!
Designed with packet in mind. Out-of-the-box high-speed, 9600 baud, interface.
Just connect your TNC to the radio and you're on the high speed packet network.
Also, operates at 1200 and 2400 baud equally well.

C5718DA

C1208DA

C5718DA TWIN-BAND MOBILE

50 Watts of power totally controlled from the microphone! Remote this radio anywhere!

Unsurpassed intermod rejection.
Built in Antenna Duplexer.
Dual frequency receive; two VHF, two UHF, or VHF/UHF.
Frequency range:
Receives 110-199.995 MHz (including AM aircraft) and 250-499.995 MHz.
50 Watts 2M, 40 Watts 70cm
(3W Low, 10W Medium selectable)
Memories: 40 (20 per band); stores frequency, offsets and CTCSS tones.
200 memory channel option, CMU182.
CTCSS Encode /Decode standard.
Frequency steps, 5, 10, 12.5, 15, 20, 25, 50 and 100 Khz.
Full Duplex cross band operation with CTCSS tones.
Paging/Coded squelch.
DTMF autopatch dialing, 6 memories, 15 digits.
Eight kinds of scan, including priority and CTCSS.
Memory scan lock-out.
Back-lit Keypad and Display
Auto mute opposite band, three settings (-6, -12 and -18dB).
Cooling fan built- in.
Size: 5.51"W 1.57"H 5.31"D Weight 2.2 lbs..
Mobile bracket and power cord (2M) included.

STANDARD HAS EVERYTHING IN THE SPEAKER-MIC WHILE DELIVERING UP TO 50 WATTS!

C1208DA TWIN-BAND MOBILE

The smallest, lowest price 2 meter mobile radio that delivers all the features. Mount it under a seat or even in the trunk using the optional extension cable (CAW561 or CAW562).

Frequency range:
Receives 110-199.995 MHz (including AM aircraft) and 250-519.995 MHz.
50 Watts, 10W and 3W selectable
Built in Antenna Duplexer for 450 MHz receive
Memories: 100; stores frequency, offsets and CTCSS tones.
CTCSS Encode/Decode standard.
Frequency steps, 5, 10, 12.5, 15, 20, 25, 50 and 100 Khz.
Paging/Coded squelch.
DTMF autopatch dialing, 10 memories, 15 digits.
Six kinds of scan, including priority and CTCSS.
Back-lit Keypad and Display
Auto mute: four settings (-10, -20, -30 and off)
Semi Duplex cross-band operation with CTCSS tones
Cooling fan built-in
Size: 5.51"W 1.18"H 5.79"D Weight 1.65 lbs..
Mobile bracket and power cord (3M) included.

MARS and CAP modification available
(permit required).

Specifications, features and price are subject to change without obligation or notice.

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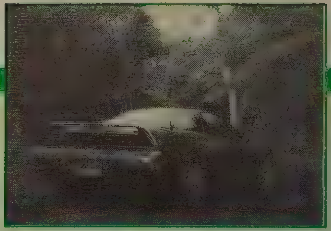
MOBILE ANTENNA PRODUCTS



Modern, high-performance stations use COMET Antennas, Duplexers, Triplexers and Accessories! COMET products are designed to provide an exceptional level of signal quality and coverage area. Whether operating mobile or from your base station, COMET products make you sound good. No other product line has the selection, convenience, quality and performance!

DUAL-BAND MOBILE ANTENNAS

FL-67S Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
146MHz 4.5dBi ⅝ wave 446MHz 7.2dBi ⅝ wave x 3	1.5:1 or less	150 watts	4' 11"	Gold Plated PL-259

FL-62S Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
146MHz 3.5dBi ½ wave 446MHz 6.0dBi ⅝ wave x 2	1.5:1 or less	150 watts	3' 5"	Gold Plated PL-259

NEW!

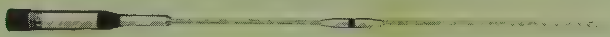
SB-7/SB-7NMO Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
146MHz 4.5dBi ⅝ wave center-loaded 446MHz 7.2dBi ⅝ wave x 3	1.5:1 or less	70W FM	4' 7"	PL-259 or NMO style

NEW!

SB-5/SB-5NMO Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
146MHz 3.0dBi ½ wave 446MHz 5.5dBi ⅝ wave x 2	1.5:1 or less	120W FM	38"	PL-259 or NMO style



NEW!

SB-2/SB-2NMO Dual-Band 146/446MHz

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
146MHz 2.15dBi ¼ wave 446MHz 3.8dBi ⅝ wave	1.5:1 or less	60W FM	18"	PL-259 or NMO style

B-10/B-10NMO Dual-Band 146/446MHz, Cellular Look-a-like

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
146MHz 0dBi ¼ wave 446MHz 2.15dBi ½ wave	1.5:1 or less	50W FM	12"	PL-259 or NMO style

B-20/B-20NMO Dual-Band 146/446MHz, Cellular Appearance, No Ground Plane Required

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
146MHz 2.15dBi ½ wave 446MHz 5.0dBi ⅝ wave x2	1.5:1 or less	50 watts	30"	PL-259 or NMO style

NEW!

SB-25/SB-25NMO Mono-Band 146MHz w/Fold-Over, No Ground Plane Required

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
146MHz 4.1dBi ⅝ wave center loaded	1.5:1 or less	100W FM	4' 9"	PL-259 or NMO style

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NEW!

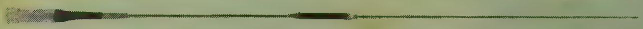
MINI SPEAKER/MIC

HM-P2K/F
Mini spkr/mic featuring full TX/RX quality!

Light weight, extremely small: 1'x2" with collar pocket clip.

HM-P2K: Kenwood Version
HM-P2F: Icom/Yaesu Standard/Alinco/etc.

TRI-BAND MOBILE ANTENNAS



CX-224/224NMO Tri-Band 146/220/446MHz, w/Fold-Over, No Ground Plane Required

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
146MHz 2.15dBi ½ wave 220MHz 3.6dBi ⅝ wave 446MHz 6.0dBi ⅝ wave x 2	1.5:1 or less	100 watts	3'	PL-259 or NMO style

FJ-15S Tri-Band 52/146/446MHz w/Fold-Over

Gain & Wave:	VSWR:	Max Power:	Length:	Connector:
52MHz 2.15dBi ¼ wave 146MHz 4.5dBi ⅝ wave 446MHz 7.2dBi ⅝ wave x 3	1.5:1 or less	120 W FM	4' 10"	PL-259

HF MOBILE AND HT ANTENNAS

HA-4S Quad-Band HF 40/*(20)/15/12/10 Meters w/Fold-Over

NEW!

Wave:	VSWR:	Weight:	Length:	Max Power:	Connector:
¼ wave	2:1 or less	1 lb. 14 oz.	4' 4"	120W SSB (200W SSB 28MHz)	PL-259

*L-14HS Optional 20 Meter Coil

SH-55 Super Flexible 146/446MHz HT Antenna

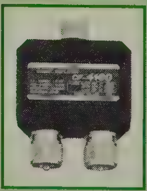
Gain & Wave:	Max Power:	Length:	Connector:
146MHz 1.5dBi ¼ wave 446MHz 3.2dBi ⅝ wave x 2	10 watts	15.5"	BNC

NEW!

CH-722SA High Gain HT Antenna
Gain & Wave: 146MHz 3.0dBi ½ wave
446MHz 5.5dBi ⅝ wave x 2
Max Power: 50 watts
Length: 35", 2 sections, 18" each
Connector: BNC

CH-32 Miracle Baby
146/446MHz HT Antenna
Gain & Wave: 0dB ¼ wave
Max Power: 10 watts
Length: 1.75"
Connector: BNC

DUPLEXERS AND MOBILE MOUNTS



CF-4106K, I, J,
146/446MHz

Band Pass, Ins Loss, Max Pwr.
1.3-150MHz, 0.1dB, 800w PEP
400-540MHz, 0.2dB, 500w PEP
Isolation: 60dB

CONNECTORS:

	4160K	4160I	4160J
Output:	SO-239	SO-239	SO-239
Low In:	PL-259	PL-259	SO-239
High In:	PL-259	N-Male	SO-239

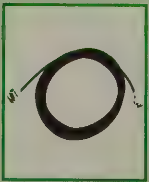
RS-21
Trunk, hatchback, rear door (van, blazer, etc.) mount. Adjustable to virtually ANY angle. Rubber-coated base protects vehicle paint.

NEW!

RS-820
Heavy-Duty, Low Profile Trunk Lip or Hatch Back Mount. Rubber-coated base protects vehicle paint.

WS-1M
Multi-Adjustable Window Clip Mount.
11.5 feet of high quality coax.
Gold-plated UHF Conns. for Antennas up to 40" in height.

NEW!



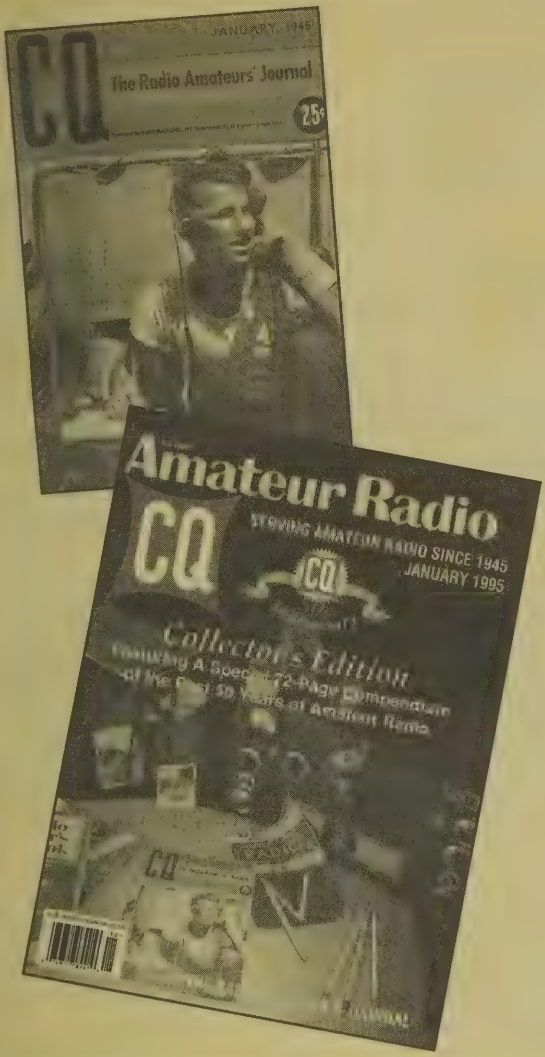
3D4M Standard Cable Assembly
13.5 feet of low loss coax. Gold plated UHF (PL-259/SO-239) connectors.

3D5M Standard Cable Assembly
Same as 3D4M, but 17 feet of coax

CK-5M Deluxe Cable Assembly
13 feet double shielded very low loss coax + 12" RG-188 teflon coax. Gold plated UHF (PL-259/SO-239) connectors.

CK-5M5 Deluxe Cable Assembly
Same as CK-5M, but 17 feet of coax

CIRCLE 149 ON READER SERVICE CARD



1945 CQ 1995
50th Anniversary

A Nostalgic Look Back Over Half A Century With CQ The Radio Amateur's Journal

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A Letter From The Publisher

The inclination at a time like this is to wax poetic about the extraordinary journey we've been on lo these fifty years. Or perhaps to preen and posture, as though our magazine, having survived for half a century, is somehow entitled to claim responsibility for the events of those five decades.

If that's your expectation as you begin to peruse this special commemorative editorial insert, then, dear reader, you're about to have those expectations dashed. That's not what this fiftieth anniversary celebration is about. *CQ*'s survival has often been more a matter of perseverance than brilliance. And persevere is what *CQ* has done.

The catch phrase we've embraced for the last 15 years is "More than a magazine, it's an institution." And yes, *CQ,* by the passage of time and by good fortune, has become an institution in Amateur Radio. Above all, however, *CQ* has been a mirror of events. That's the way it should be, in my opinion. As media, our first responsibility has always been to report the events of the Amateur Radio world as we understand them. We're not always pleased with what we report, but our role is to reflect the world around us, not to shape the events that occur in that world.

Inevitably, though, the words we print sometimes do help to shape events. A "throw away" comment by *CQ* columnist Don Stoner, W6TNS, in his Semiconductor Column in April 1959 can be marked as the first public push to create and launch an Amateur Radio satellite—the birth of the OSCAR concept. The editorial comments of various editors over the decades have given encouragement to such radical concepts as the Novice license, HF voice for Novices, the codeless Technician license, SSB operation, FM repeaters, RTTY and later Packet operation, SSTV, reciprocal licensing, and the list goes on and on. But no magazine makes things happen; people make things happen. Magazines, through their editors and authors, are merely the messenger boys. Oh yes, we'll voice opinions and grouse about the decay of values and glamorize the virtues of Amateur Radio as it was when we got started. But we're the reporters, or if you prefer, the critics, not the performers. That's your role.

When we set out to prepare this special insert, the original plan called for a running history of *CQ* from 1945 to 1994. As we expanded the concept it became apparent that while the physical history of *CQ* rests on a book shelf containing almost 600 issues, *CQ*'s history was better told as two parallel histories: one of the world and the other of Amateur Radio itself. And that's the direction we've taken. Interspersed among five decades of "Joe's Journal" by Rich Moseson, NW2L, and five decades of Ham Radio history as told by Bill Orr, W6SAI, and Joe Lynch, N6CL, are numerous fascinating short items related to *CQ* and to communications development.

The silent hero of this special presentation is one of the most multi-talented people I've ever had the pleasure to work with, Rich Moseson, NW2L, who has labored for months on end to bring our formative ideas to reality. Thank you, my friend.

The ultimate thanks for making this Fiftieth Anniversary celebration possible belongs to others: to the thousands of contributing authors over the years whose creativity provided the tens of thousands of pages of great reading, to the many tens of thousands of readers over the years whose faith in our product has made it possible to publish, to the many hundreds of advertisers who have similarly supported us (sometimes when we really didn't deserve that support!), and to a combined several hundred staff members over this half century who have toiled countless hours to bring it all together month after month, year after year. We can only estimate the total pages delivered so far at somewhere over 60,000! (We don't have the heart to ask any one to actually count it all!)

I've devoted the last 34-plus years of my life in the creation of *CQ*. Chances are that I won't be around to celebrate the passage of the next 50, but here's hoping that both *CQ* and our beloved Amateur Radio will indeed see that centennial. Join me in a toast to the greatest hobby in the world, and to a quiet observer of its passing parade—*CQ, The Radio Amateur's Journal.* Happy Birthday!

73,

Richard A. Ross, K2MGA

Richard A. Ross, K2MGA
Publisher

THE WHITE HOUSE
WASHINGTON

September 27, 1994

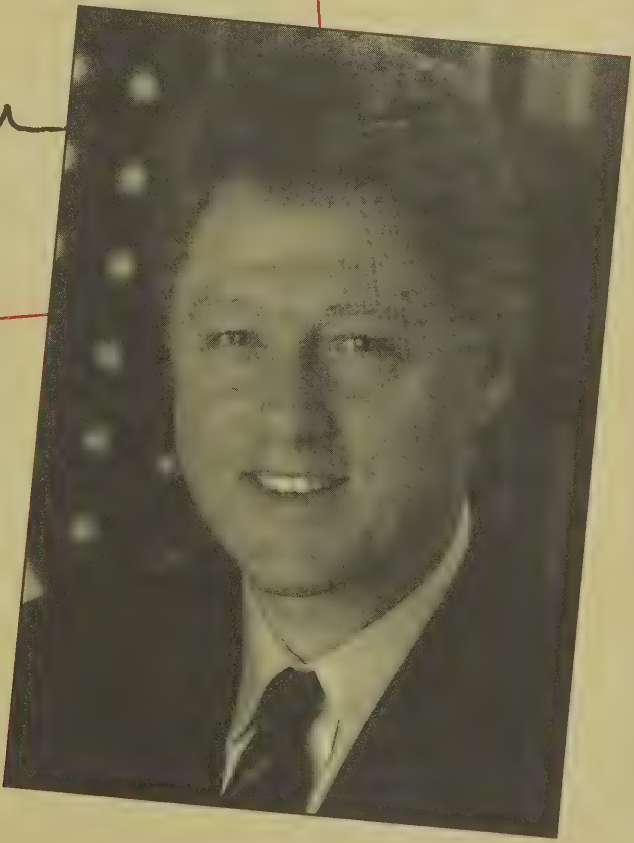
Congratulations to the writers, staff, members, and supporters of CQ: The Radio Amateur's Journal as you celebrate your fiftieth anniversary in print.

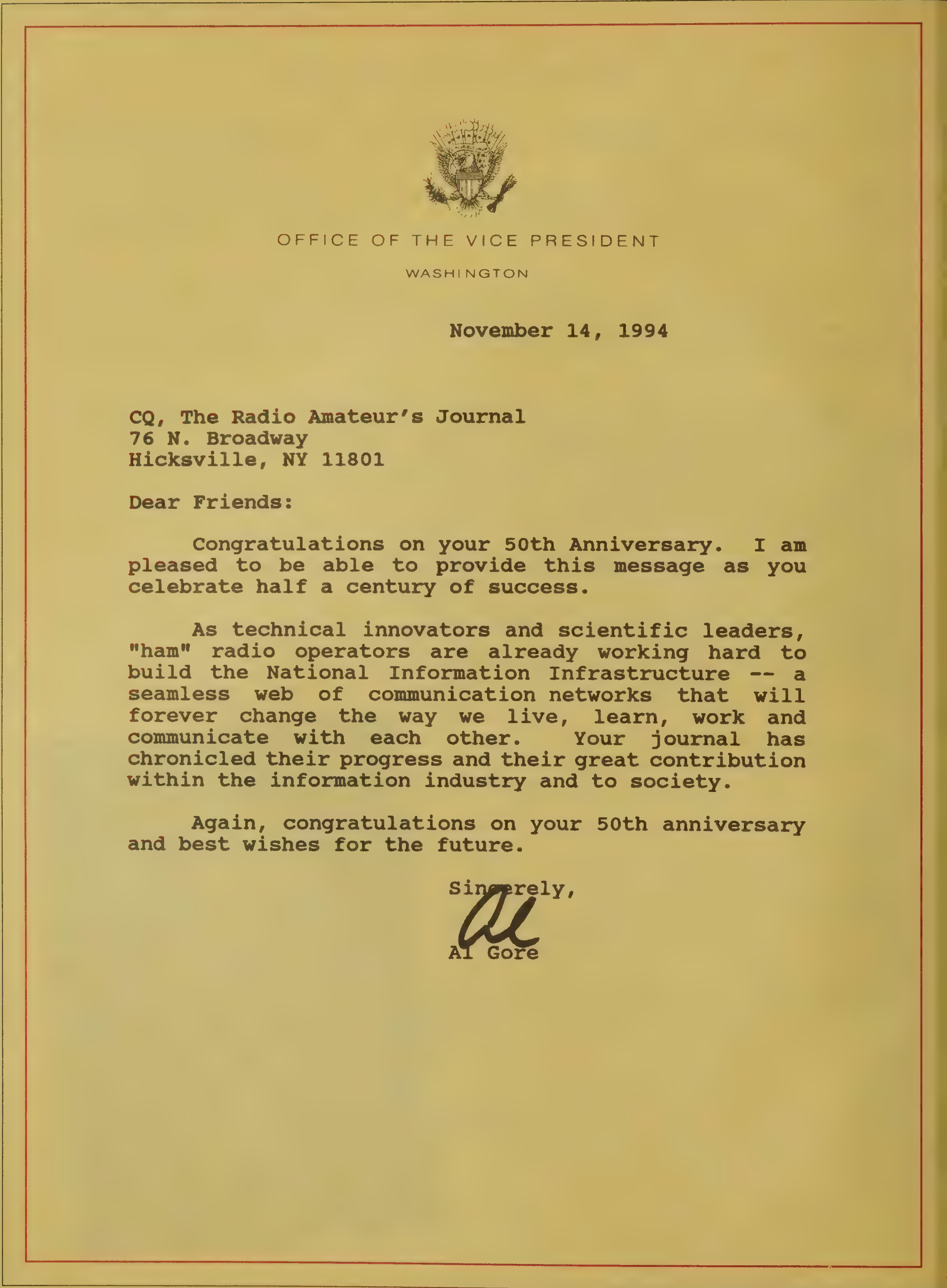
Since its inception, amateur radio has been far more than a hobby for its users. It is a way to communicate with people across international boundaries and cultures, to express ideas and share opinions, and to make new friends. Helping to bring together ham radio operators from around the world, CQ has served to advance this unique activity and to promote international understanding.

Each of you can be proud of your role in producing such a successful and widely read publication. CQ's longevity is a tribute to the quality of the staff and readership who have supported this magazine since 1945.

Best wishes for continued success.

Bill Clinton





OFFICE OF THE VICE PRESIDENT

WASHINGTON

November 14, 1994

CQ, The Radio Amateur's Journal
76 N. Broadway
Hicksville, NY 11801

Dear Friends:

Congratulations on your 50th Anniversary. I am pleased to be able to provide this message as you celebrate half a century of success.

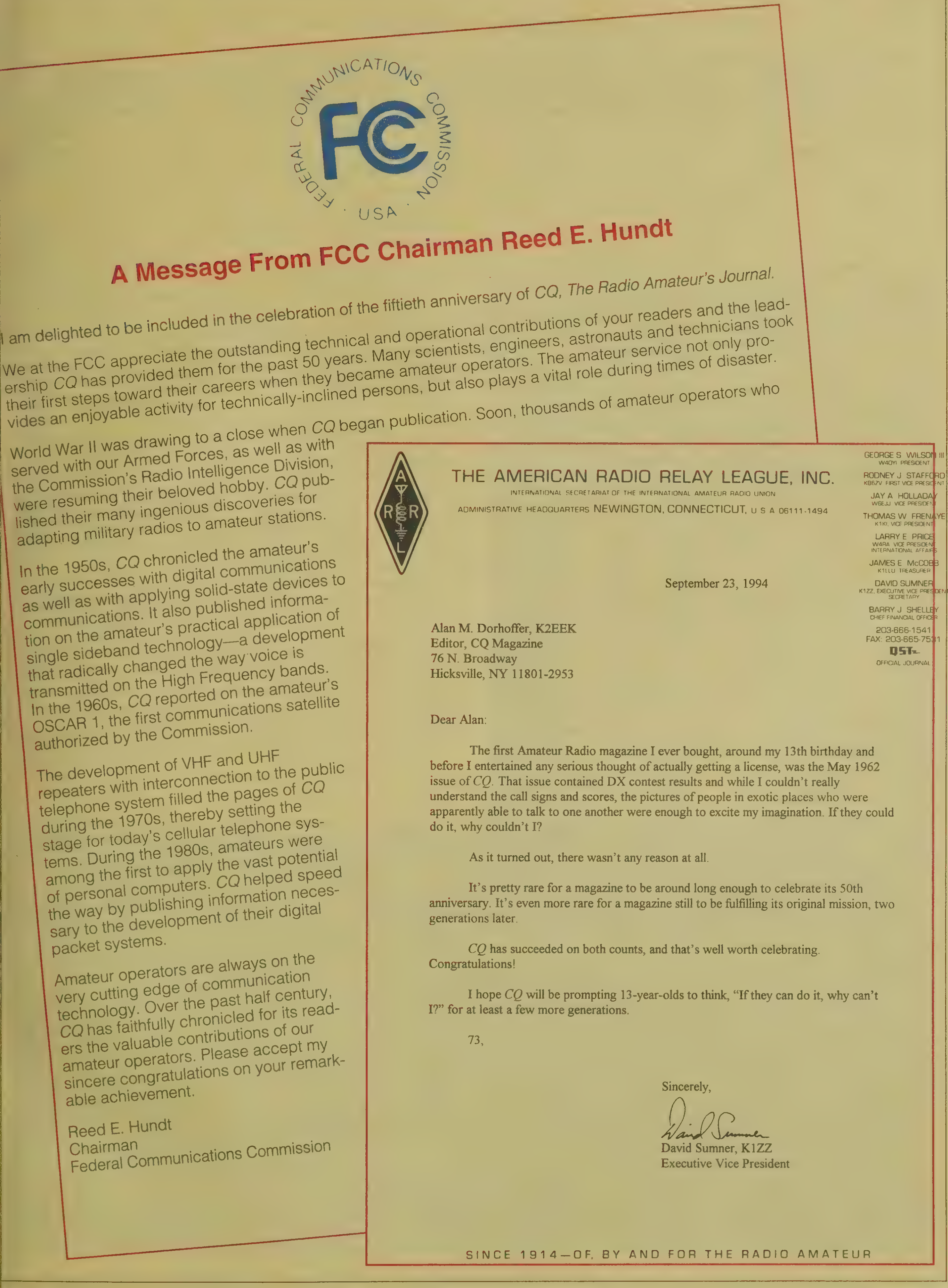
As technical innovators and scientific leaders, "ham" radio operators are already working hard to build the National Information Infrastructure -- a seamless web of communication networks that will forever change the way we live, learn, work and communicate with each other. Your journal has chronicled their progress and their great contribution within the information industry and to society.

Again, congratulations on your 50th anniversary and best wishes for the future.

Sincerely,

Al

Al Gore



FEDERAL COMMUNICATIONS COMMISSION · USA

A Message From FCC Chairman Reed E. Hundt

I am delighted to be included in the celebration of the fiftieth anniversary of *CQ, The Radio Amateur's Journal.*

We at the FCC appreciate the outstanding technical and operational contributions of your readers and the leadership *CQ* has provided them for the past 50 years. Many scientists, engineers, astronauts and technicians took their first steps toward their careers when they became amateur operators. The amateur service not only provides an enjoyable activity for technically-inclined persons, but also plays a vital role during times of disaster.

World War II was drawing to a close when *CQ* began publication. Soon, thousands of amateur operators who served with our Armed Forces, as well as with the Commission's Radio Intelligence Division, were resuming their beloved hobby. *CQ* published their many ingenious discoveries for adapting military radios to amateur stations.

In the 1950s, *CQ* chronicled the amateur's early successes with digital communications as well as with applying solid-state devices to communications. It also published information on the amateur's practical application of single sideband technology—a development that radically changed the way voice is transmitted on the High Frequency bands. In the 1960s, *CQ* reported on the amateur's OSCAR 1, the first communications satellite authorized by the Commission.

The development of VHF and UHF repeaters with interconnection to the public telephone system filled the pages of *CQ* during the 1970s, thereby setting the stage for today's cellular telephone systems. During the 1980s, amateurs were among the first to apply the vast potential of personal computers. *CQ* helped speed the way by publishing information necessary to the development of their digital packet systems.

Amateur operators are always on the very cutting edge of communication technology. Over the past half century, *CQ* has faithfully chronicled for its readers the valuable contributions of our amateur operators. Please accept my sincere congratulations on your remarkable achievement.

Reed E. Hundt
Chairman
Federal Communications Commission

ARRL

THE AMERICAN RADIO RELAY LEAGUE, INC.
INTERNATIONAL SECRETARIAT OF THE INTERNATIONAL AMATEUR RADIO UNION
ADMINISTRATIVE HEADQUARTERS NEWINGTON, CONNECTICUT, U S A 06111-1494

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OFFICIAL JOURNAL

September 23, 1994

Alan M. Dorhoffer, K2EEK
Editor, CQ Magazine
76 N. Broadway
Hicksville, NY 11801-2953

Dear Alan:

The first Amateur Radio magazine I ever bought, around my 13th birthday and before I entertained any serious thought of actually getting a license, was the May 1962 issue of *CQ*. That issue contained DX contest results and while I couldn't really understand the call signs and scores, the pictures of people in exotic places who were apparently able to talk to one another were enough to excite my imagination. If they could do it, why couldn't I?

As it turned out, there wasn't any reason at all.

It's pretty rare for a magazine to be around long enough to celebrate its 50th anniversary. It's even more rare for a magazine still to be fulfilling its original mission, two generations later.

CQ has succeeded on both counts, and that's well worth celebrating. Congratulations!

I hope *CQ* will be prompting 13-year-olds to think, "If they can do it, why can't I?" for at least a few more generations.

73,

Sincerely,

David Sumner

David Sumner, K1ZZ
Executive Vice President

SINCE 1914—OF, BY AND FOR THE RADIO AMATEUR

Happy Birthday To Us—All of Us!

Welcome to *CQ*'s special Golden Anniversary section. While our main purpose here is to celebrate our magazine's 50th anniversary in print, 1995 also marks two other important anniversaries in our amateur radio world. It is the 50th anniversary of amateur radio's return to the air after World War II, and the 100th anniversary of amateur radio itself!

Back in 1895 Guglielmo Marconi made his first successful radio tests in Italy. And while many may argue that innovators such as Heinrich Hertz and Mahlon Loomis actually invented radio, it was Marconi who made it work and who created the world of electronic communication that we know today. Marconi often said that he always considered himself an amateur. And so, on the occasion of the 100th anniversary of the first ham's first transmissions, we all can wish ourselves a happy birthday for our hobby. May it still be here 100 years from now!

Time Travel

We'd like to take you back in time to 1945 and invite you to join us on a journey to the present. Our special anniversary section is broken down into five main segments, one for each decade, starting in 1945. Within each decade segment, we have two main groups of articles:

"Ham Radio History," by Bill Orr, W6SAI (1945–54, 1955–64 and 1965–74), and Joe Lynch, N6CL (1975–84 and 1985–94)—the first comprehensive history of amateur radio since Clinton DeSoto's classic, *200 Meters and Down,* published in 1936.

"Joe's Journal," by Rich Moseson, NW2L, a personalized account of major developments in world and technical history since 1945. "Joe" is a fictitious ham—perhaps "G.I. Joe" himself—back from the war and keeping a journal of his business activities. Every ten years Joe looks back at the world events of the past decade through a personal "journal entry." (Since these entries are set in 1955, 1965, etc., you may find some language that while not considered "politically correct" today, was perfectly acceptable at that time. We hope no one is offended.)

Also included are highlights of *CQ* history, a series of articles that combine reporting on the magazine's distant past (going back to 1917), its birth and its growth, with reminiscences of people who helped make *CQ* what it is today.

We hope you'll find our special anniversary section informative and enjoyable, whether you're reminiscing about old times or learning about our history for the first time. We'd like to start our trip by reprinting below excerpts from the very first editorial from the very first issue of *CQ*, fifty years ago this month. It sets forth the magazine's original editorial goals, goals that remain essentially the same a half century later.

> It is inevitable that new devotees should gravitate every year toward the greatest hobby in the world—amateur radio. It is generally believed that the rate of enlistment in the amateur ranks will be greatly augmented when peace again lifts transmitting bans. Conservative estimates place the number of hams five years from V-Day at better than 200,000—contrasting with some 60,000 amateurs shortly prior to Pearl Harbor. Ex-servicemen who have learned enough from walkie-talkies, radar and field equipment to feel the nip of the amateur radio bug will add to the normal civilian increment of youth and oldster similarly and perennially infected.
>
> This, then, is the *raison d'etre for CQ*—a magazine for the radio amateur, with a particular invitation to the newcomer. It should not, however, be inferred that we shall confine ourselves to the ABC's of ham radio. We visualize *CQ* as a magazine that will stick with the ham long after the parts of his first rig are dust-laden in the junk box, and as a monthly refresher course for the old timer. While placing some emphasis on the elementary, we are still under obligation to carry through with articles on modern techniques and apparatus. Similarly, we shall follow up tradition (with which every ham must be familiar) with all the vital news of amateur radio today and tomorrow.
>
> In radio transmissions, the letters "CQ" have somewhat different meanings in the commercial and amateur fields. With commercial wireless, "CQ" is the nature of a general call announcing a broadcast. In ham radio it is most often a friendly invitation to get together and ragchew. As a publication, *CQ* will similarly play a dual role—in the broadcast sense as a disseminator of what one should know to make the most out of ham radio, and in the less formal character as your own magazine, welcoming criticism as well as bouquets, and, above all, the cordial exchange of ideas that is so vital a part of ham radio on the air.
>
> *from January 1945* CQ

Acknowledgements

This special anniversary section was made possible through the hard work, help and cooperation of many people, and it would not be complete without acknowledging their assistance. First of all, our writers: Bill Orr, W6SAI, and Joe Lynch, N6CL, who took on the gargantuan task of documenting the past half century of ham radio; along with Bryan Bergeron, NU1N, and Neil Friedman, N3DF, who contributed additional perspective through their respective articles (Neil's article will appear later this year).

Current and former *CQ* editors and columnists helped out as well, especially George Jacobs, W3ASK, who shared his 44 years of experience at *CQ* in three separate articles; along with Don Stoner, W6TNS, and Wayne Green, W2NSD.

CQ Publisher Dick Ross, K2MGA, and Editor Alan Dorhoffer, K2EEK, shared some of their recollections both in writing and in interviews with this writer; former publishers Sanford Cowan and Richard Cowan, WA2LRO, provided invaluable insight through interviews, as did former editors Gene Black, W2LL, and Arne Trossman, W2DTJ, along with former Advisory Editor Robert York Chapman, W1QV.

Audio magazine editor Gene Pitts, another magazine-history buff, provided valuable background information on our common ancestor, *Radio* magazine; along with John P. Wolkonowicz's cover photographs of *Radio* and its predecessor, *Pacific Radio News*. Doug Grant, K1DG, graciously loaned us copies of several of the *CQ* issues you'll see illustrated here (all of our old copies are bound, making it difficult to photograph the covers). Other photographs were provided by George Jacobs, W3ASK, and Jean Ferrell, widow of former *CQ* editor Perry Ferrell.

Finally, none of this would actually have appeared in print without the tremendous help of our dedicated *CQ* staff, especially Managing Editor Gail Schieber and Art Director Elizabeth Ryan. Thank you all for making me look good!

Rich Moseson, NW2L
CQ 50th Anniversary Coordinator &
Anniversary Section Editor

Was There Life Before *CQ*?

By William I. Orr, W6SAI

The magazine you hold in your hands is celebrating its 50th anniversary. *CQ*'s "family tree," however, goes back a long way—back to 1917, during World War I. This is the story of the illustrious ancestry of the modern *CQ* magazine as gathered from some of the old-time amateurs who took part in those fascinating beginnings and as based on subsequent research.

The Early Days

In the year 1917, during the depths of World War I, amateur radio was banned from the airwaves. Even so, there was much excitement over the infant art of transmission and reception by wireless. San Francisco in particular was a hotbed of interest, as ships of the U.S. Navy had been in port and one of them had broadcast programs to the general public, playing scratchy phonograph records and giving news of fleet activity.

The die was cast. A group of wireless enthusiasts at the San Francisco Radio Club formed a small partnership and started publishing a thin magazine called *Pacific Radio News*. Early issues were subtitled "Pioneer Journal of Western Radio News and Development." After a break in publication (due to the war) between May 1917 and January 1920[1], the magazine prospered and slowly grew in circulation, featuring articles of interest to the broadcast listener as well as the radio amateur. In the late '20s, though, it began to evolve into a radio trade magazine of interest mainly to radio distributors and stores catering to the growing broadcast boom.

The end of the broadcast craze and the start of the Great Depression in the fall of 1929 brought lean years to the magazine, which by now had shortened its name to *Radio*. Finally, in 1933 in a last-ditch effort to keep the magazine alive (and after a merger with *Modern Radio*) the publishers switched editorial policy and decided to devote *Radio* to amateur radio. Paradoxically, amateur radio had boomed during the depression years. Young men, out of a job, with plenty of time on their hands (and little money in their pockets) found that for a few dollars a decent shortwave receiver could be built from a defunct battery-operated broadcast receiver. Also, for a little more money a simple, one-tube shortwave transmitter could be assembled from the same broadcast receiver! *Radio* sensed this boom as it started, and decided that amateur radio was where its future lay.

JANUARY, 1921

20 CENTS

PACIFIC RADIO NEWS

warning!

PACIFIC RADIO SUPPLIES CO
638 Mission St., San Francisco, Ca

ATLANTIC RADIO SUPPLIES CO
8 Kirk Place, Newark, New Jersey

Photos of early covers by John P. Wolkonowicz, courtesy Audio *magazine.*

The Great Days

Radio, the magazine for radio amateurs, made its debut in the summer of 1933. It was a large magazine, about the size of today's *Time,* but a lot thinner. It was touch and go in the early months.

Looking back on those days from these days, it is impressive to review the famous amateurs who contributed to *Radio*. Some of them were: Frank Jones, W6AJF; Clair Foster, W6HM; Don Wallace, W6AM; Charles Perrine, W6CUH; Herb Becker, W6QD; John Reinartz, W1QP, and Frank Lester, W2AMJ.

Compared to other amateur radio magazines *Radio* was a blockbuster! Each issue was chock-full of exciting ideas and circuits that the average ham could understand and build. *Radio* promoted the two-tube superhet, the resistance-coupled VHF receiver, the famous Frank Jones "53 oscillator," high-efficiency grid modulation and much more. It was an impressive magazine produced by a small group of enthusiastic amateurs.

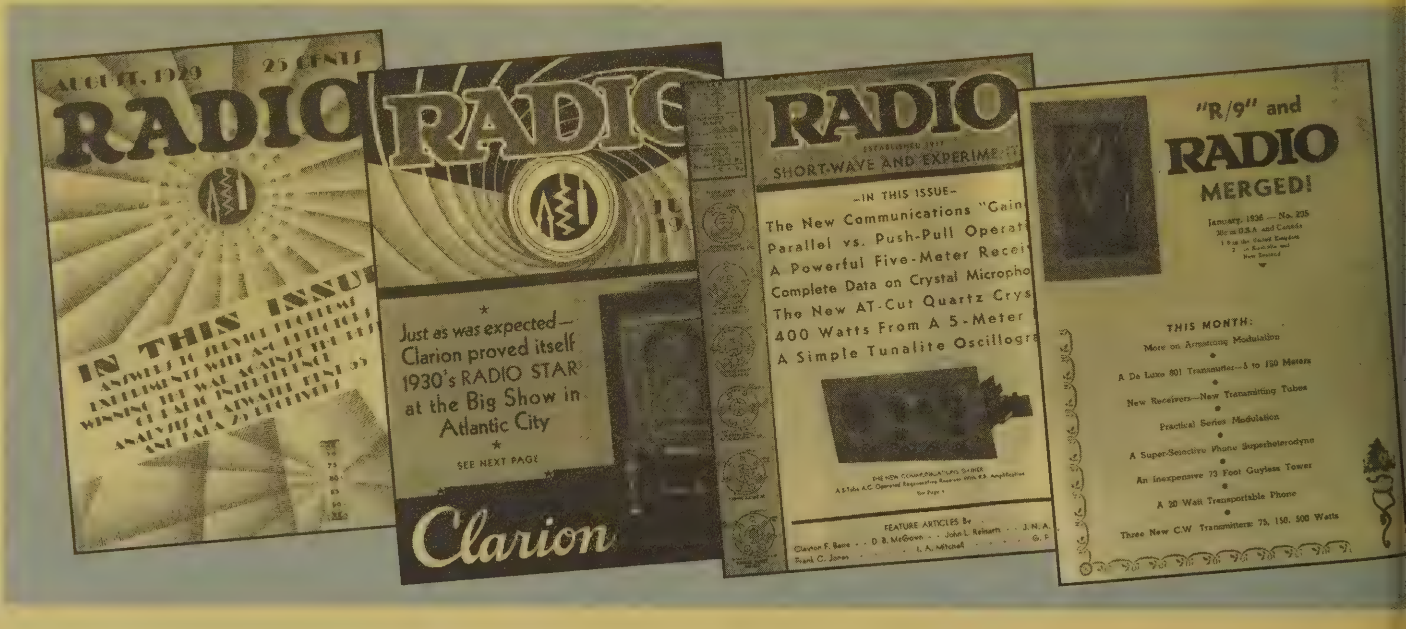
The Merger

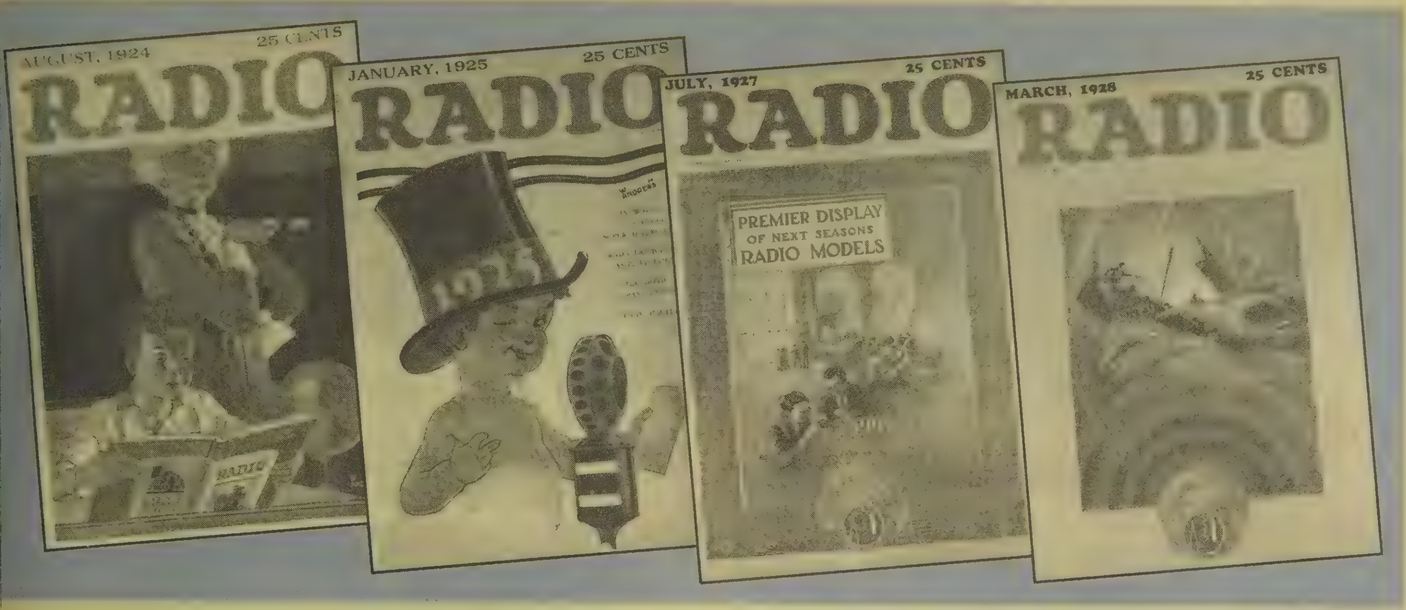
One of the competitors for the readers' attention was a brash, upstart, Los Angeles-based magazine called *R/9*. This was published by Killian Lansingh, W6QX. Among its "star" writers were: Ray Dawley, W6DHG; Leigh Norton, W6CEM, and W. McNatt, W6FEW. Although smaller than *Radio*, *R/9* had better financial backing, and in 1936 the two magazines merged into a new, bigger *Radio*.

The new *Radio* pioneered break-through concepts such as the three-element, all-aluminum Yagi beam; crystal-controlled "UHF" transmitters; simple amateur radio receivers and chassis-type construction of the transmitter. It also blazed new trails with articles on simple transmitters and receivers for the "UHF" bands—10 and 5 meters. The future looked good for *Radio*, its dedicated publishers and amateur radio in general.

December 7, 1941

The advent of World War II demolished amateur radio. The market for amateur radio gear collapsed and the various amateur magazines suffered accordingly. *Radio* grew thinner month by month, and even the idea of


AUGUST, 1929
25 CENTS
RADIO
IN THIS ISSUE
RADIO
Just as was expected— Clarion proved itself 1930's RADIO STAR at the Big Show in Atlantic City
SEE NEXT PAGE
Clarion
RADIO
SHORT-WAVE AND EXPERIME
–IN THIS ISSUE–
The New Communications "Gain
Parallel vs. Push-Pull Operat
A Powerful Five-Meter Recei
Complete Data on Crystal Micropho
The New AT-Cut Quartz Crys
400 Watts From A 5-Meter
A Simple Tunalite Oscillogra
FEATURE ARTICLES By
"R/9" and
RADIO
MERGED!
THIS MONTH:
More on Armstrong Modulation
A De Luxe 801 Transmitter—5 to 160 Meters
New Receivers—New Transmitting Tubes
Practical Series Modulation
A Super-Selective Phone Superheterodyne
An Inexpensive 73 Foot Guyless Tower
A 20 Watt Transportable Phone
Three New C.W. Transmitters: 75, 150, 500 Watts



expanding it to include high-fidelity audio techniques, FM, theory and self-training articles on elementary electronics didn't help much.

By mid-1943 *Radio* was on its last legs. The magazine was sold in 1944 to John Potts and S. R. "Sandy" Cowan. Potts became editor and Cowan was publisher. *Radio* was now sub-titled "The Journal for Radio-Electronic Engineers," and it continued as a broadcast-oriented magazine until May 1947, when its focus and its title were changed to *Audio Engineering*. In 1954 the name was shortened to *Audio*, and that magazine continues to thrive today.

Cowan and Potts, apparently at the urging of FCC officials who felt that ham radio should have more than one magazine (*QST*), also kept alive *Radio*'s long tradition of service to amateur radio. In January 1945 they launched a new magazine which combined the inherited genes of exuberant California radio pioneers with the knowledge and expertise of the east coast amateur radio community. It was called *CQ—The Radio Amateur's Journal*. To this day it carries on the hopes and efforts of a handful of radio amateurs, who in the beautiful, foggy city of San Francisco had a great idea in the bygone year of 1917.

> ***"Compared to other amateur radio magazines Radio was a blockbuster! Each issue was chock-full of exciting ideas and circuits that the average ham could understand and build."***

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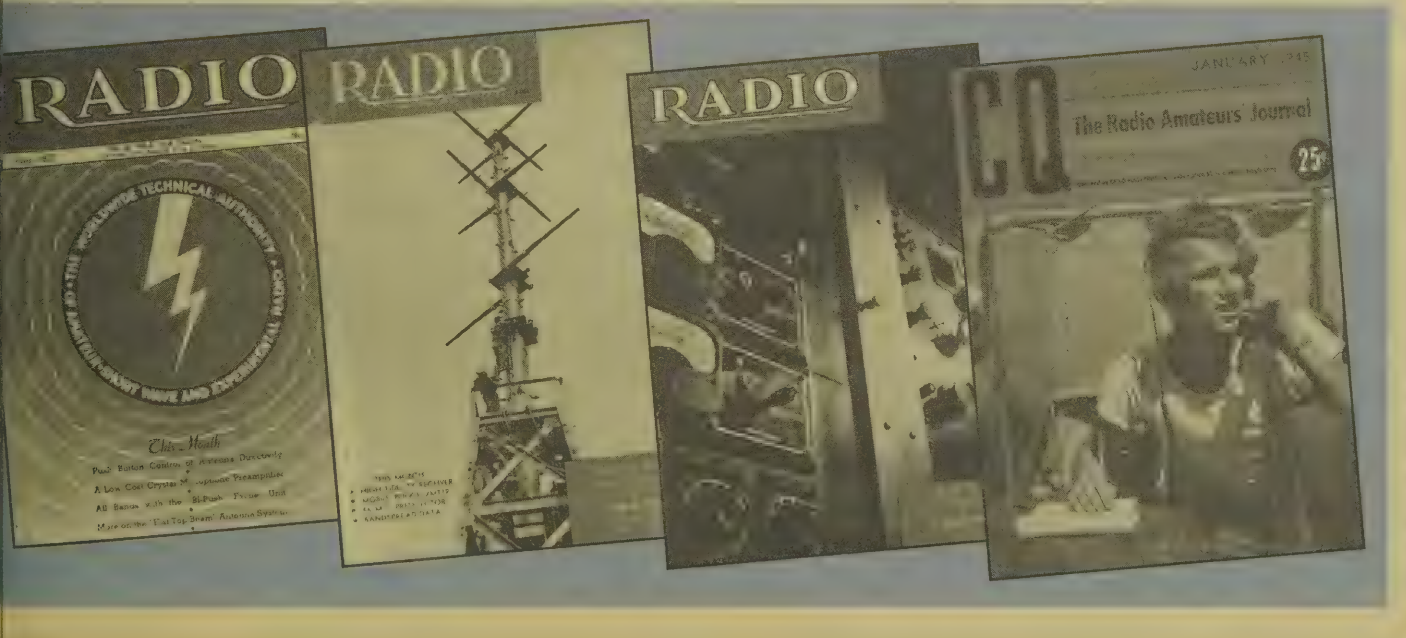
[1] *Wolkonowicz, John, "Audio's 35th Birthday," Audio magazine, May 1982, pp. 33–35.*


RADIO
THE WORLDWIDE TECHNICAL AUTHORITY OF AMATEUR SHORT WAVE AND EXPERIMENTAL RADIO
This Month
RADIO
RADIO
CQ
JANUARY 1945
The Radio Amateurs' Journal
25¢

1945–1954: A Decade of New Beginnings

The end of World War II brought a new political order to the world, along with the new threat of nuclear war. It brought ham radio back to life, and started it down a road to a radically different future. This was the decade in which the transistor was born and computers began finding practical use in business. This was the world into which *CQ* was born in 1945.

In the articles that follow, Bill Orr, W6SAI, explores the rebirth and growth of ham radio in the late '40s and early '50s, when surplus was king and something new called the Novice license came on the scene; the birth and early years of *CQ* are recounted by those who were there, and "Joe's Journal," by NW2L, reminds us of important world events and developments in technology.

Ham Radio History

1945-1954: On the Air Again!

By Bill Orr, W6SAI

August 21, 1945. Four days after V-J day, after being closed down "for the duration," hams were back on the air! After a long, cruel war in which most amateurs served (and many died), the amateur radio bands came back to life!

The startup was slow, a temporary FCC order (terminating November 15th) authorizing general ham activity on a portion of the old 2½ meter band! Quickly by government standards, and sluggish by ham-time, other bands were authorized in November—a portion of 10 meters, 5 meters, the new 2 meter band and other VHF and microwave bands came into being. In February, 1946 the new 6 meter band was authorized, while the old 5 meter band was delegated to TV Channel 2.

In spring 1946 portions of 80 and 40 meters were relinquished by the military for amateur radio operation, followed shortly by a chunk of the 20 meter band. By November all new ham bands had been activated, with the exception of 160 meters, a captive of the Loran navigating system.

By fall 1946 VHF activity was accelerating. W3HWN sported a 16-element, 144 MHz billboard antenna, double the size of pre-war 2½ meter arrays. He described it in the new *CQ* magazine, the first issue of which had appeared in January 1945.

It is apparent in reading the early issues of *CQ* that the pre-war modulated oscillator, so popular on 5 meters, was doomed on 6 meters when it was found to be unintelligible on sporadic-E DX openings. The super-regenerative receiver, a pre-war standby of the VHF operator, failed on the basis of poor selectivity and spurious signal radiation. Better equipment was on the horizon. VHF interest was high, and a popular propagation column was started in *CQ*, with O. P. "Perry" Ferrell as editor.

By mid-1946 ten meter DX was in full flower, with many GI stations active around the world. FA8NF (Algeria), W8BOR/PY (Brazil), DL4AA (Germany) and W6OCA/J3 (Japan) were some of the stronger signals. The race for new DX was on!

And so it was by the end of 1946 that amateur radio was launched in a direction that eventually led to a technical rev-

Joe's Journal

January 1955

It's now been 10 years since I started keeping this journal. Most of my everyday entries have dealt with personal or business matters, so I thought this would be a good time to take a look back at the past decade and review the events that have shaped our world in that time. If I have the energy, I'll do it again in another 10 years.

Of course, the biggest thing that happened as the decade began was the end of World War II. In early 1945, Allied troops were advancing across Europe and retaking Pacific islands from the Japanese. One of the greatest shocks of the war came when our troops began liberating the Nazis' concentration camps, and news spread of what had gone on inside them. It's hard to believe that so many millions of people were imprisoned, enslaved and executed just for being different. The Nuremberg War Crimes trials in 1945 and '46 brought the worst of the Nazis to justice for "crimes against humanity,"[1] but they couldn't bring back the millions who had died.

The Germans finally surrendered in May, but fighting against the Japanese dragged on until we dropped atom bombs on Hiroshima and Nagasaki in August. The death and destruction from those two bombs was awful, but probably much less than what would've been if we'd had to invade Japan and fight to the finish. I hate to even think about what might have happened then.

The Yalta conference between Roosevelt, Churchill, and Stalin seemed to lay the foundation for the post-war world. Then President Roosevelt died and Harry Truman became President. The poor man had no idea what he was in for when he accepted the Vice-Presidential nomination just a year before. And it seemed as if he wasn't any better prepared when he suddenly found himself in the top job. I think history will be kind to Truman, though. He learned fast and he stuck to his motto, "The Buck Stops Here."

Our military never got much of a break, even after World War II. We were occupying Japan and part of Germany, and we had a new enemy to worry about. Our wartime allies, the Russians, seemed intent on taking over the world themselves, or at least spreading Communism wherever they could. During the late '40s one country after another in Eastern Europe was taken over by Communists. Soviet troops and tanks made sure there was no dissent. British

The first issue of CQ, January 1945.

olution that changed the face of amateur radio forever. But no one could foretell what was coming to pass.

At this time a survey showed that 25 percent of amateur phone operation took place on 10 meters, 9 percent on 20 meters, 11 percent on 75 meters, 5 percent on 2 meters and 1 percent on 6 meters. The remaining percentage of hams were either inactive or "about to get on the air." All phone operation, with the exception of some FM, was amplitude modulated (AM). ⟶

Prime Minister Winston Churchill described it in 1946 as an "iron curtain" falling over Europe.

The Soviets even tried to push the U.S., Britain and France out of West Berlin. In 1948 they cut off all roads and rail lines leading out from the city to the western occupation zones. President Truman responded with a massive airlift of food and coal that lasted nearly a year. Finally, the Russians backed down.

But they're not giving up. In 1949 they exploded their own A-bomb, and two years ago they followed up with a hydrogen bomb. The threat of World War III is still very real.

It's been no quieter in Asia over the past 10 years, even though Japan abolished its armed forces under a new constitution and was under the thumb of occupation forces led by General Douglas MacArthur.

Civil war raged in China, where Chaing Kai Shek's nationalists were eventually defeated by Mao Tse Tung, who established a Communist "People's Republic" on the mainland in '49, after pushing the nationalists off to the island of Formosa. Who knows when the Reds will invade Formosa?

Once a Communist government was firmly in control in China, war broke out next door in Korea. Communist ⟶

CQ is Born

By Richard S. Moseson, NW2L

As World War II was winding down, Sanford Cowan and John Potts bought *Radio* magazine from its west coast publishers and moved it to New York. (See Bill Orr's "Was There Life Before *CQ*?" for the history of *Radio*.) Even before the war *Radio*'s focus had been shifting away from hams and toward broadcasters. Cowan and Potts continued that shift (*Radio* eventually became *Audio Engineering*, the predecessor of today's *Audio* magazine [see photos on next page]), but started *CQ* as *"The Radio Amateur's Journal."* According to Cowan, *CQ* was born, in part, because the FCC didn't think *QST* should be the only magazine dedicated to amateur radio.

"I was publishing other magazines at the time," Cowan told *CQ* recently. "Commissioner Fly (then-FCC Chairman James Lawrence Fly) suggested that I start a ham magazine to compete with *QST*. I told him that would be impossible because I hardly had enough paper to print the magazines I was already publishing. *(Virtually everything, including paper, was rationed during World War II.—ed.)* He then said that he'd get me the paper quota if I'd promise to start the magazine. So that's how it started. It was practically a mandate from people in Washington who didn't want *QST* to be alone in the business."

There were also hams who missed *Radio*'s focus on their hobby. There are conflicting versions of what happened next. Here's one participant's recollection:

"I helped John Potts get (*CQ*) started," says Robert York Chapman, W1QV, who was listed as "Advisory Editor" on early issues of *CQ*. "It was a case of two fellows having picked up a magazine, *Radio*, on the west coast. John Potts, the engineer, called me up and said someone told him I was an old-time ham. He had bought the name, *Radio*, and he had only the dream of creating an engineering magazine. I said, 'John, that's really a ham magazine.' The next week Potts went up to Albany and got a copyright for *CQ* magazine."

"Of course, Cowan was strictly a businessman," Chapman continued. "And he already had connections from his other magazine, *Radio Service Dealer*, for getting newsstand distribution. So he and Potts put together the first issue of *CQ*. They borrowed the money from somewhere and printed 10,000 copies. They put it in newsstand circulation and sold every copy." *CQ* was on its way.

And what of Chapman's own role in the magazine? "It was strictly a friendship thing. I never got paid," he recalls, adding, "Anytime I get *CQ*, I'm proud of those two guys. I always told them hams were the nicest people anywhere, and if they hadn't started this, they never would have gotten to meet any of them . . . I think the amateur hobby itself owes a lot to John Potts and Sandy Cowan."

(Left) The final issue of Radio *magazine, which had become an engineer's journal. (Right) The first issue of* Audio Engineering, *successor to* Radio *magazine.*

Ham Radio History *cont.*

Starting Anew On A Pre-war Basis

Before World War II amateur radio seemed quite simple. AM phone and CW were the principal modes of communication. Aside from the 5 meter band, only a few hardy experimenters ventured into the mysterious "ultra-high frequency" region. Suitable tubes, circuits and know-how were not generally available. Amateur radio had a high frequency cutoff at 2 meters, or so it seemed. The beginning ham gravitated to 5 meters with a simple two-tube transceiver, to 160 meter phone or to 80 meter CW. There was good reason for this. It took skill to make a good 40 or 20 meter transmitter, and even more expertise and luck to build a 10 meter rig! The higher frequencies were not suited to breadboard construction. On the other hand, a 5 meter "rushbox" with battery supply could be built in a day out of junkbox parts!

Antennas for the HF bands were mainly single-wire affairs, with a few advanced operators using W8JK-style beams. Some DXers had two- and three-element rotaries and were held in awe by less fortunate competitors.

At first most HF operation was crystal controlled, but the stable VFO had appeared just before the war, and it quickly became an add-on to most of the homemade, post-war transmitters.

The year 1947 saw a quickening interest in the 6 meter band, a lot of activity on 2 meters in the metropolitan areas, and some interest in ham television and FM. Jack Babkes, W2GDG, introduced amateurs to Narrow-Band FM with an article in the March 1946 issue of *CQ*, laying the groundwork for all of today's VHF-FM amateur communications. Also in 1946 *CQ* announced reactivation of the WAZ award, which it inherited from the old *Radio* magazine. (W6SAI was the recipient of the fourth award.) W6WB described a 14 MHz preselector with a 6J6 tube and discussed receiver intermodulation caused by strong local signals. A growing number of VHF crystal-controlled stations were on the air, and DXers were working up to 600 miles on 144 MHz!

Plenty of cheap war-surplus coax was on the market, and a major achievement in amateur radio came about in mid-1947 with the introduction of the SWR meter, which could measure the standing wave on a transmission line! Truly a remarkable development!

The cubical quad antenna was introduced to amateur radio in 1948 and quickly became popular on 10 meters. During this exciting time, though, there was a growing problem with television interference. Some hams avoided the TV problem by operating mobile, especially since the FCC now permitted mobile operation on the lower frequency bands. W2CVV described in *CQ* a high-Q mobile antenna loading coil for 80 meters. For DX-minded hams W6WB showed a beautifully built push-pull 4-250A amplifier for 14 MHz. The *CQ* technical articles were rapidly becoming first-rate!

"Clever Little Devices"

Way back in 1940 a scientist at Bell Laboratories in New Jersey entertained his colleagues by shining a flashlight on what physicist Walter Brattain later described as "a little chunk of black stuff with a couple of contacts on it." As Brattain recalled and related to Time magazine in 1960, "When he shone a flashlight on it, he got a voltage. I didn't believe it."

Brattain may not have believed it, but he set to work along with colleagues William Shockley and John Bardeen to figure out why that "black stuff"—silicon—did what it did. Seven years later (after a minor interruption called World War II) Shockley sent a note to fellow scientists, inviting them to his laboratory for a demonstration of "some effects." A sliver of germanium with three wires attached was amplifying a current that was applied to it. The "transistor effect" clearly worked, but the reason remained a mystery.

For the next six months a team of 40 Bell Labs scientists worked on the project, and in June 1948 Bell Labs issued an invitation to the outside world: "The Bell Telephone Laboratories wishes to demonstrate today a new device. Its essential simplicity indicates the possibility of widespread use."

It was perhaps the understatement of the century. The transistor has indeed found "widespread use," revolutionizing not only electronics, but our entire way of life. The transistor and its descendants have made it possible for us to travel in space, make phone calls from our cars, send computer messages from anywhere and have fully-featured amateur radio rigs that slip into our pockets.

Did the forward-thinking hams of 1948 see this potential? Well, here's an excerpt from a brief article in the October 1948 issue of *QST*, describing Bell Labs' announcement of the transistor: "It doesn't appear that there will be much use made of Transistors in amateur work, unless it is in portable and/or compact audio amplifiers. The noise figure is said to be poor, compared to that obtainable with vacuum tubes, and this fact may limit the usefulness in some amateur applications."

The writer managed to redeem himself somewhat, however, by concluding, "These clever little devices are well worth keeping an eye on."

—NW2L/W6SA

War Surplus Floods the Market!

At first many amateurs had to make do with pre-war equipment or build from scratch. Manufacturers slowly geared up for some post-war ham receivers. New designs were in the works. Cardwell and Millen had new double-conversion receivers on the drawing board, and Collins Radio was adapting a military receiver design to the amateur bands (soon to be known as the 75A-1). But the first post-war production receivers were warmed over, pre-war designs. Hallicrafters announced the new S-40, S-38 and SX-42 (versions of the pre-war S-20, Sky Buddy and SX-28). Hammarlund was ready with a post-war Super-Pro and a reboxed HQ-129X. New miniature receiving tubes promised improved reception well into the VHF region, and these were incorporated in some receivers.

A lot of well-meaning plans came to an abrupt halt when the Reconstruction Finance Corp. and the War Assets Administration changed the look of amateur radio with the release of a flood of surplus military communication gear!

It had been predicted earlier that the amount of surplus gear to be released would be small, with most of it in poor condition. The prediction was wrong!

The avalanche started as a trickle in early 1946 and grew to astounding proportions as cheap surplus drove out more expensive post-war equipment. (Gresham's Law as applied to amateur radio!)

Look! The BC-348 HF communication receiver, brand new for $69! The famous Hallicrafters BC-610, 450 watt CW/fone transmitter, brand new, for $500 or less! The SCR-522 transmitter/receiver for 2 meters for under $15! Transmitting tubes at fire-sale prices! The 304TL for 75 cents! The 813 for $6.95! The 872 rectifier for $2! Other astounding bargains were at hand. Surplus RG-8/U coax for 6 cents a foot! A kilowatt-plus plate transformer for $19.95! Four kV, 4 µF filter capacitors for less than $5! And don't forget 807s for 65 cents!

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Joe's Journal *cont.*

troops from North Korea invaded the south in 1950. The newly-formed United Nations (1946), in its first major action, called for an immediate cease-fire and asked its members to help South Korea. President Truman ordered U.S. forces into Korea and put General MacArthur in charge. After the Chinese entered the war in late 1950, however, MacArthur started arguing publicly with the President over policy. Guess he forgot what "commander-in-chief" means. Truman fired him. The war raged on until a cease-fire was finally worked out just two years ago. And there's still no peace treaty. Just a cease-fire, and another 54,000 American tombstones.

There's more trouble brewing in Southeast Asia, in a little country called Vietnam. In 1950 President Truman sent 35 American military advisers to help the French keep control of their colony there. But last year the French lost a big battle at a place called Dien Bien Phu. Now the French are leaving, and Vietnam, like Korea, is divided in two, North and South. President Eisenhower has just sent more advisers to help the government in the south. There are supposed to be reunification elections there next year. I hope that all works out.

Luckily we managed to keep our troops out of the fighting in the Middle East. The trouble there started when the UN

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"Where Do We Go From Here?" *CQ*'s Early Days

By Richard S. Moseson, NW2L

The first issue of *CQ* amazed its owners by selling out its entire 10,000-copy print run. Advisory Editor Robert York Chapman, W1QV, recalls publisher Sanford Cowan exclaiming, "God, I can't believe it. We've sold everything!"

"A week or so later, I went to New York," Chapman recalls, "and John Potts (*CQ*'s first editor) said to me, 'Where do we go from here?' I said to check if, when you bought the magazine, did you buy rights to a thing called WAZ? He said, 'What's that?' I told him it was a very popular program with the DXers, and it had been run by *R/9* and then *Radio*. A few weeks later Potts told me 'I checked that, and I do own that. It came with the magazine.' He showed me a WAZ certificate."

The Worked All Zones award had been around since 1934, when *R/9* magazine started it as a challenge to DXers. In 1936 *R/9* merged with *Radio*, *CQ*'s predecessor, and *Radio* continued the WAZ program. *CQ* brought it back in 1947 as the cornerstone of its now-extensive program of awards and contests.

A certificate doesn't make a magazine, however, and it's hard to make a ham magazine work unless you have a ham at the helm. (Neither Potts nor Cowan were ever licensed.) Larry LeKashman, W2IOP, became that ham.

"I was instrumental in getting John Potts to hire Larry LeKashman," recalls Chapman. "He had a lot of smarts and helped build that thing (*CQ*) up quite a bit."

Founding publisher Sanford Cowan agrees: "Larry LeKashman was a superb ham and editor."

Even though John Potts retained the title of Editor until shortly before his death in 1949, "Larry LeKashman really ran the book," according to Richard Cowan, WA2LRO, *CQ*'s publisher from 1958–1979, and son of founding publisher Sanford Cowan. "He was highly respected as a ham and was one of the best contesters there ever was."

LeKashman first appeared on *CQ*'s masthead in April 1945 as Assistant Editor. He became Managing Editor a year later. That April 1946 issue introduced three new columns: "The YL's Frequency," by Amelia Black, W1NVP; and "Club News"; and "UHF," by Josephine Conklin, W9SLG. Jo Conklin and her husband, Bill (who was still serving in the Navy), had been *Radio*'s UHF columnists. Another *Radio* transplant was DX columnist Herb Becker, W6QD, whose "CQ DX" column appeared a month before the others, in March 1946.

The May 1946 issue saw the addition of Oliver P. "Perry" Ferrell to the masthead as a contributing editor. Ferrell was not a ham, but was the leading authority of the day on the new art of propagation forecasting. His monthly "DX Predictions" column became a *CQ* fixture that continues to this day under the stewardship of George Jacobs, W3ASK. (See George's accompanying article, "*CQ*: Taking the Mystery Out of HF Propagation.")

With LeKashman and Ferrell on board, along with continuity from former *Radio* columnists, *CQ*'s course was firmly set, and John Potts's question, "Where do we go from here?" had been answered.

CQ's "Guiding Lights"

***CQ* Editors, 1945–1954**

John H. Potts: Jan. 1945 – Jan. 1949
Larry LeKashman, W2IOP: Feb. 1949 – Oct. 1949
Albert E. Hayes, W2BYF: Nov. 1949 – Dec. 1950
Eugene Black, Jr., W2ESD (now W2LL): Jan. 1951 – Sept. 1951
Oliver P. "Perry" Ferrell, Managing Editor: Oct. 1951 – Jan. 1955

CQ had five editors in its first ten years, but the names on the masthead don't really tell the story. The magazine's first editor, John Potts, wasn't a ham and divided his time between *CQ* and *Radio*, which later became *Audio Engineering*. Through those years Larry LeKashman, W2IOP, was first Assistant Editor and then Managing Editor. And while he was officially editor for only nine months, it was LeKashman who actually got the magazine off to a solid start, especially from a ham radio perspective. (See the accompanying article, "Where Do We Go From Here?") LeKashman went on to a very successful career in the radio equipment business after leaving *CQ* in 1949.

Gene Black, now W2LL, was also editor for only nine months, in 1951. However, he had been on *CQ*'s staff since 1946. "I used to ghost-write a lot of stuff," Black remembers. "In one issue I had three or four articles under different names, not one of them my own."

Oliver "Perry" Ferrell exerted a tremendous influence on *CQ*'s early days. Ferrell was never a ham, but he was the leading authority of the time on RF propagation (see W3ASK's "*CQ:* Taking the Mystery Out of HF Propagation"). Perry was *CQ*'s managing editor from late 1951 until he left at the end of 1954 to become the founding editor of *Popular Electronics*. Ferrell's departure closed the books not only on *CQ*'s first decade, but also on *CQ*'s first generation of editorial leadership. The people who got the magazine off the ground were gone, and editorial control passed for the first time into the hands of "newcomers."

Ham Radio History *cont.*

Wow! The home-brew artist's dream come true!

The surplus gear that attracted the most hams was the ARC-5/SCR-274N communication system. Designed for aircraft, these light-weight, well-made HF transmitters and receivers flooded the market and were grabbed up by hams. The receivers were marginal in performance, but the transmitters were made into VFOs, low-power rigs and even SSB exciters! The BC-453 low-band receiver could be lashed up as a selective I-F amplifier which provided narrow I-F bandwidths, better than any available communication receiver.

Another popular surplus rig was the SCR-522 transmitter/receiver. Designed for aircraft, it covered the 100–156 MHz range with four crystal-controlled channels. Power output was about 8 watts, AM. Thousands of these landed in the new 2 meter band. The receiver wasn't easy to convert to amateur radio use, but the transmitter was ready to go and really "state of the art" for those days!

A hot item of surplus gear was the BC-375 transmitter. This 100 watt "boat anchor" was of prehistoric (1927) design and was useless for amateur work, but it was a gold mine of priceless components for the home constructor.

The flood of equipment was a ham's dream and a manufacturer's nightmare. Only the strong companies blessed with luck, superior engineering talent, low-cost manufactur-

Joe's Journal *cont.*

voted to divide up Palestine into a new Jewish state and a separate Arab one. Actually, there'd been trouble there for a long time. But when the British—who'd been occupying the area since the end of World War I—pulled out their troops in 1948, Jewish leaders declared independence and formed the state of Israel. And troops from surrounding Arab countries immediately invaded to block creation of the new country. Fighting continued until a cease-fire was agreed to in early 1949. The two sides still won't talk to each other, though. So there's no formal peace treaty and there's always the risk that they'll start fighting again.

Here at home the picture has been brighter. Relative peace has brought relative prosperity. Food rationing ended right after the war ended, and Truman lifted wage and price controls in 1946. More people than ever before own cars. The folks who keep track of these things say there were 28 million private cars on U.S. roads in 1946—and that it's nearly doubled to 52 million today. Most of us have enough money to buy what we need. Soon, however, we may not need money anymore. At least not cash.

A company called Diner's Club came up with something called a "charge card" five years ago. It's a piece of plastic with your name on it. And when you eat out at restaurants that accept it, you don't have to pay cash for your meal! You just hand the waiter your card, sign a piece of paper with the charge on it, and Diner's Club sends you a bill at the end of the month. I think it'll be real handy for businessmen, but frankly, I don't think plastic will ever replace good, old-fashioned cash.

We've not only got more money to spend, but more time to spend it. Work weeks are shorter and our lives, in general, are longer. Medical science has made great strides in the past decade. The age of "wonder drugs" was launched in 1948, when chemist Percy Julian discovered a way to make cortisone cheaply and brought relief to thousands of arthritis sufferers. A heart-lung machine was used successfully for open-heart surgery the first time in 1953, and just last year doctors in Boston performed the first kidney transplant using a live donor. Of course, not all of our medical problems are solved. A couple of years ago scientists showed that tobacco smoke causes cancer in mice, and suggested it probably does the same in people. It won't be easy convincing people to stop smoking, though—especially when the tobacco companies have so much at stake.

Another polio epidemic swept the country in 1952, affecting more than 47,000 people. But there's great hope right now. In the same year as the epidemic, Dr. Jonas Salk developed a polio vaccine. Large-scale immunizations were

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ing facilities and plenty of cash would survive in the long run.

On the technical side, W2KUJ described a phasing-type SSB exciter which confused most hams, but provided a source of much-needed information for the small, technically-minded group of SSB enthusiasts. For the home-construction gang Bill Scherer, W2AEF, described in *CQ* an easily-built grid-dip oscillator that proved to be a popular piece of gear and was soon copied by various manufacturers.

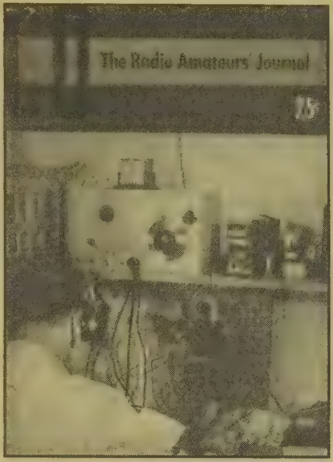
The Atlantic City Conference: The Recurring Nightmare!

Amateur radio barely escaped with its life at the International Radiotelegraphic Convention in 1927. Regional amateur radio assignments were chopped severely and new operating restrictions imposed. But amateur radio survived!

Now, 20 years later, in 1947, amateur radio was again under international scrutiny at the Atlantic City International Administrative Radio Conference. Shortwave broadcasting grabbed more of the 40 meter band and a portion of the 80 meter band. Twenty meters had 50 kHz chopped off the top end for the fixed service. Ten meters lost the top 300 kHz! One-sixty meter operation was severely restricted, and the 11 meter secondary assignment was switched to the newly-expanded Citizens Radio Service. Regional variations were imposed on the VHF/UHF amateur bands. On the brighter side, a new 15 meter ham band was a result of the Conference and amateur radio survived once again.

DX is King!

And what a thrill it was to work DX after years of silence! Twenty and 10 meters were open to the world, and transoceanic QSOs on 6 meters came about in late 1946. Best of all, amateur radio had a new 15 meter band! By 1950 upwards of 230 countries had been worked by avid DXers!



Gradually the flood of surplus gear subsided and amateur radio returned to its more traditional role, still refreshed by plenty of rebuilt surplus equipment, but experiencing an influx of new post-war gear, as manufacturers recovered from the bitter deluge of cheap military radios. Gone was the BC-348—too unstable and too broad. Gone was the BC-610—a victim of TVI and new transmitter concepts, unrealized a decade earlier. Gone was the SCR-522 as new tubes and circuits provided improved VHF performance. Only the sturdy ARC-5/274N gear survived, modified in uncountable ways to meet the many needs of the early fifties. Best of all, in 1951 RCA announced a new beam tetrode to replace the venerable 807—the 6146.

DX enthusiasts turned towards 3-element rotary beams for the higher bands, and 30-element arrays were used by some of the "big guns" on 144 MHz. The era of the big antenna was at hand! ⟶

Communications Prophet

Most of us have come to take the miracles of modern communication for granted. Phone calls, faxes and e-mail flash around the world in an instant. Reporters using portable earth stations guided by handheld GPS (Global Positioning System) satellite receivers chat on live TV from the remotest points on Earth. Only a true visionary could have predicted all this back in 1965, when Early Bird, the first geosynchronous communication satellite, was launched.

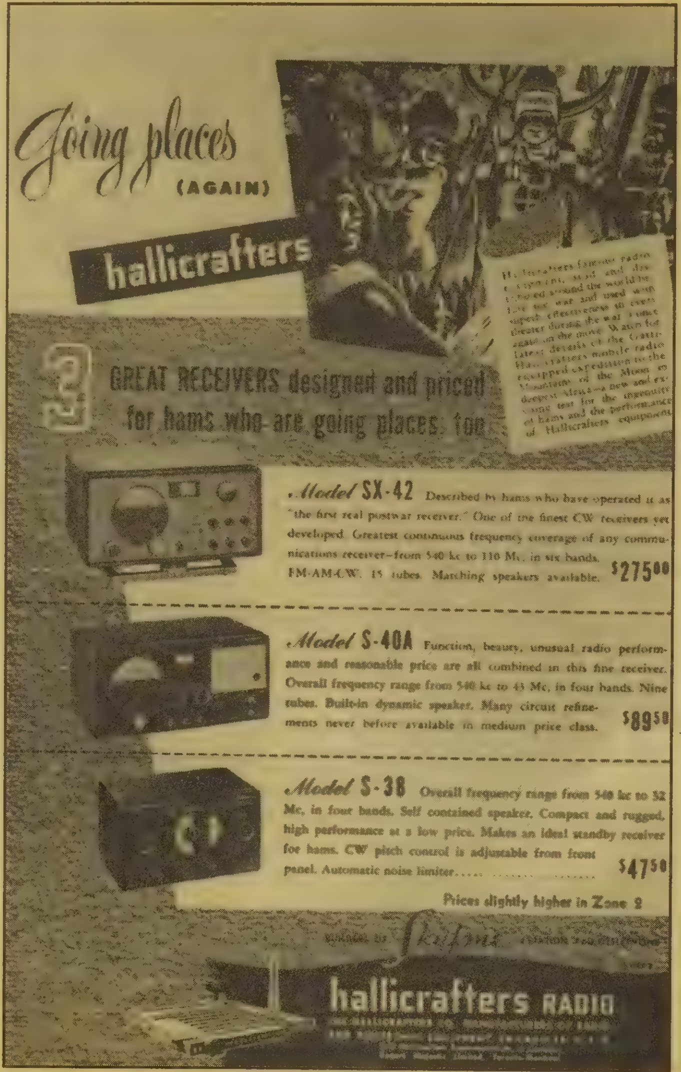
There was one man, however, who predicted it all in 1945. Arthur C. Clarke, who hadn't yet begun writing science fiction, published an article in the British magazine *Wireless World,* in which he detailed his concept for a fleet of high-orbiting satellites relaying telephone and television signals to the world.

These satellites, Clarke wrote, would circle the Earth at an altitude of 22,300 miles. (Remember, in 1945 the highest any rocket had flown was about 100 miles.) At that height, he calculated, a single orbit would take exactly 24 hours, making the satellite seem to hang in one spot overhead. "It would remain fixed in the sky of a whole hemisphere," he wrote, "and unlike other heavenly bodies, would neither rise nor set." Clarke's prediction—and his accurate calculations—laid the foundation for our entire communication satellite industry.

After Early Bird was launched in '65, *Time* magazine quoted some new predictions from the now-famous science-fiction writer. For example, "multiple satellites will offer so many kinds of entertainment that no one will need be confined to programs that are not to his taste." While the Greek drama and chess channels that Clarke foresaw haven't come to pass, most cable systems today offer a minimum of 50 or 60 channels.

Time also wrote in 1965 that "One of Clarke's more frightening thoughts is that every man on earth will eventually have his own telephone number and will carry personal apparatus that will permit him to be called, even by people who have no idea where he may be." Parts of that prediction have already come true, and the rest is right around the corner.

And what does Clarke predict for our future? Well, it seems to be right out of his 1968 film classic, "2001: A Space Odyssey." In a 1993 interview with *Wired* magazine, he foresees finding "efficient and reliable propulsion systems" to make space flight affordable and commonplace. "There's no reason why," Clarke says, "in the next century, it should cost more to go the moon than it costs to fly around the world today." —*NW2L*



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Prices slightly higher in Zone 2

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Ham Radio History *cont.*

The WAZ and DXCC lists grew longer, and more and bigger DX contests were being initiated, including the CQ World-Wide DX Contest, which debuted in 1948. The "California Kilowatt," once a local phenomenon, was now flourishing world-wide, judging from some of the powerful signals from the USA as well as overseas!

The TVI Scourge

Old habits and old techniques were quickly put to the test in the post-war period. By 1947 it became apparent that the traditional ham gear in general use was inadequate to cope with the stunning growth of television. No longer did viewers have to go to the corner bar to see their favorite program. They could buy a 6 or 10 inch television for their homes! Hallicrafters and National, among others, advertised TV receivers in *CQ* (which also carried ads for TVI filters)!

More and more TV stations came on the air, mainly on the lower channels and most with low power, as compared to today's mammoth TV transmitters. The unshielded, harmonic-prone transmitters of pre- and post-war design brought about uneasy times and nationwide strife between hams and TV viewers. Many hams simply had to close down to appease their angry neighbors, who resented Uncle Miltie being torn asunder by a neighboring amateur radio station!

The TVI remedies appeared almost concurrently with the problem. Applying them, however, was a difficult matter. Slowly the techniques of better transmitter circuit design, filtering and shielding were hammered out and the problem of harmonic radiation finally abated. A profound sea-change in amateur equipment helped save the day, for surely if things had continued as they had been previously, the pressure of adverse public opinion would have destroyed amateur radio. One solution was single sideband. Another was mobile operation, which exploded in popularity when the FCC opened all bands to that style of communication.

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Joe's Journal *cont.*

started last year. Eliminating polio would truly be a miracle.

Life at home is getting easier, too. The iron may be on its way out. The folks at duPont have figured out a way to spin fibers from polyester, a type of plastic. They call it Dacron, and it's starting to show up in "drip-dry" shirts that dry without wrinkles. Flat shirts are great, but flat tires aren't. And there are less of the latter now, thanks to the introduction of the tubeless tire in '47. Two years ago Pirelli and Michelin brought out a whole new type of tire called the "radial." I haven't figured out how to use them with my vertical yet.

In the kitchen we now have frozen prepared foods available; there's a whole new kind of cooking out there, too. It uses microwaves to heat food. Some restaurants have been using these new microwave ovens since 1947, and just last year a home model came on the market. Also last year something called the "TV Dinner" appeared. It's a whole meal, frozen, that you heat up and can eat while you're watching TV. And that, of course, brings us around to the topic of technology and electronics.

Television has really taken off in the years since 1945. It started when RCA brought out a 10-inch tabletop set in 1946 for just $375. That made TV affordable for lots of people. Now we're even starting to see color programs—the first commercial color broadcast was in 1950—but most of us still have black-and-white television sets, so we can't tell the difference.

The biggest thing to happen in electronics this decade was the development of something called the "transistor." Three scientists at Bell Labs in New Jersey figured out how to make a sliver of germanium into an amplifier. It has the potential to replace vacuum tubes in many applications. But *QST* says we shouldn't expect it to have much impact on ham gear. The first commercial product using transistors was a hearing aid that came out three or four years ago, and last year a transistor radio from Japan went on sale here. Now *that* has potential. There's only one problem: Most of the kids will be using transistors to amplify their already-loud music. I'm not real worried, though. This "rock 'n roll" stuff will never last.

Transistors are also likely to play a big role in things such as computers. Big machines such as ENIAC and UNIVAC are making computers a reality for big business and the government. The Census Bureau bought one of the first UNIVACs in '51. That makes sense. And CBS News used a UNIVAC to predict the outcome of the 1952 presidential election. The way I hear it, the computer predicted a big win

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CQ: Taking the Mystery Out of HF Propagation

By George Jacobs, W3ASK

For 44 years George Jacobs, W2PAJ/W3ASK, has provided CQ's readers with the very latest state-of-the-art world-wide band opening predictions, day-to-day propagation forecasts and down-to-earth explanations of HF propagation phenomena. These have taken the mystery out of HF propagation, and have contributed much to making amateur radio more enjoyable and more effective as a communication medium.

As Dean of our editorial staff, we have asked George to reminisce with us. Here he recalls his own introduction to CQ *and its early recognition of the importance of propagation forecasting.*

I was first licensed as W2PAJ in December 1941, and was on the air for only two days when the shut-down came after the Pearl Harbor attack. I used my amateur radio knowledge to great advantage when I entered the U.S. Army Air Corps Aviation Cadet program in 1943. I received my wings in June 1944 as a Radar Navigator and Communications Officer. I purchased my first copy of *CQ* from the PX at my Bomber Base at Bassingbourne, England, where I flew in B-17s with the 8th Air Force. In fact, my log shows that I carried a copy of that issue with me on a mission to Leipzig during March 1945.

I first subscribed to *CQ* after I returned to University in 1946. Since I was specializing in wave propagation, I found the propagation column of particular interest. The art of predicting HF propagation conditions was developed during World War II. *CQ* recognized the importance of this to amateur radio, and was the first publication to bring to its readers easy-to-use band-opening data.

Oliver "Perry" Ferrell was chosen as *CQ*'s first Propagation Editor, and his first column appeared in the June 1946 issue. He took the mystery out of band openings, and he boiled down a great deal of scientific data into easy-to-use graphs and charts. The column was an immediate success. Because of my professional interest in HF propagation, his was the first column that I read each month.

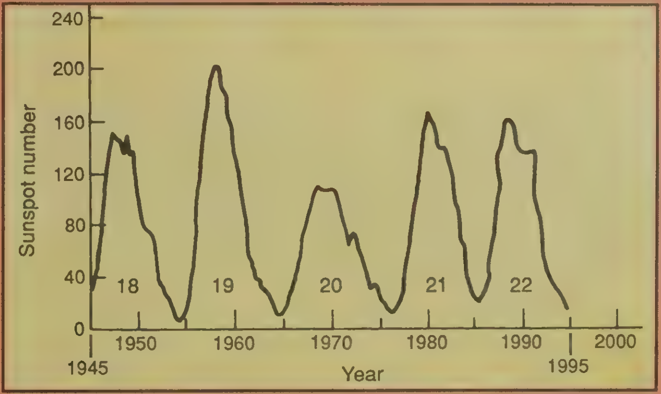
Perry Ferrell also brought *CQ* and its readers into the front line of VHF ionospheric research with the *Radio Amateur Scientific Observations* project, which was funded with a government grant. Much of what we know about ionospheric propagation above 50 MHz originated with this project, based entirely upon radio amateur participation. The project began in 1946 and continued for four years. I was one of Perry's observers, and through this relationship I developed a close professional and personal friendship with him. This lasted until about a decade ago when a drunk driver tragically took Perry's life.

Perry Ferrell, CQ's First Propagation Editor

In 1949 I joined the engineering staff of the Voice of America, specializing in HF propagation. One of my tasks was to write a weekly propagation report for VOA listeners, which was also included in a weekly VOA broadcast for radio amateurs. The program was written by Gene Black, then W2ESO, now W2LL, who was also Editor of *CQ*. It was voiced by the late Bill Leonard, W2SKE.

Due to the pressure of his research work, Perry Ferrell had to discontinue writing the Propagation column. Gene Black asked if I would be interested in writing it, since a great deal of reader mail had been received asking that it be continued. I accepted, and my first column appeared in March 1951. I have continued to write it every month since then without ever missing a deadline.

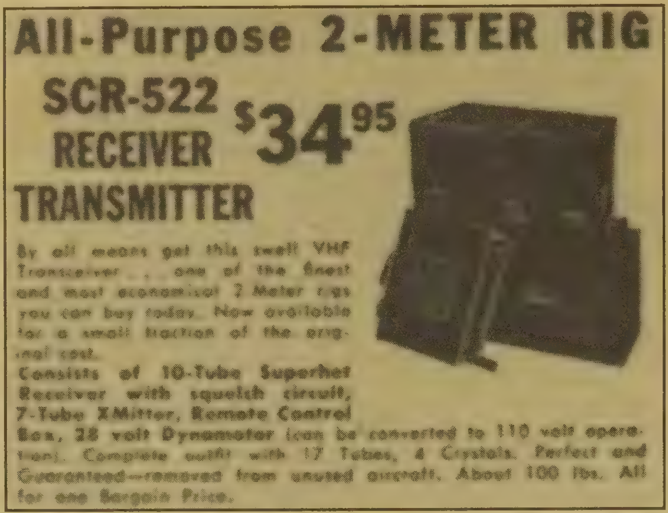
Engineers and scientists in the field of shortwave or high-frequency communications often measure elapsed time not in months or years, but in *solar cycles*. A solar or sunspot cycle has an average life of approximately eleven years. The first issue of *CQ* in January 1945 coincided with the very early years of sunspot cycle 18, and *CQ* has endured cycles 19, 20, 21 and cycle 22 through its present demise. In terms of sunspot cycles, *CQ* is five cycles old, and my time with *CQ* spans the last four cycles.



The 50 years that CQ has been in print coincides with sunspot cycles 18 through 22. This is the highest level of sustained solar activity recorded since observations began during the mid-18th century.

What cycles these have been! The 50 years that *CQ* has been in print have coincided with the highest levels of sunspot count recorded since the first observations were made during the mid-18th century. Included in this period was the mother of all solar cycles, cycle 19, which reached the record-breaking peak of 201 in November 1957, producing "once in a lifetime" propagation conditions on the HF bands. My columns during 1957, and some special articles that I wrote at that time, are among the most exciting for me, since I realized that I was writing about a scientific event which was very unlikely to be equaled in the next century or two. During the past 50 years three other cycles—18, 21 and 22—exceeded a count of 150. This was nature's salute to *CQ* magazine!

Writing the propagation column is a sideline for me, which I obviously enjoy very much. I pay very special attention to the columns I write each October and November for the CQ World-Wide DX Contests, because of the very heavy use radio amateurs world-wide make of the HF bands during these contests. Such contests also serve as excellent checks on the accuracy of band-opening predictions and day-to-day propagation conditions. To date, the accuracy of these contest columns exceeds 90%. And if current conditions have you depressed, take heart. Cycle 23 is right around the corner!



All-Purpose 2-METER RIG

SCR-522 RECEIVER TRANSMITTER $34.95

By all means get this swell VHF Transceiver . . . one of the finest and most economical 2 Meter rigs you can buy today. Now available for a small fraction of the original cost.

Consists of 10-Tube Superhet Receiver with squelch circuit, 7-Tube XMitter, Remote Control Box, 28 volt Dynamotor (can be converted to 110 volt operation). Complete outfit with 17 Tubes, 4 Crystals. Perfect and Guaranteed—removed from unused aircraft. About 100 lbs. All for one Bargain Price.

Ham Radio History *cont.*

Single Sideband and Other Things on The Horizon

The year when single sideband was introduced to amateurs at large was 1948. True, experimenters had been working with this radical new technique since 1933, but circuit complexity and the lack of suitable filters, plus receiver and transmitter instability, made it a plaything for only a few smart engineering types. To most hams the SSB concept was incomprehensible, and anyhow, it sounded like Donald Duck when tuned in! It was not an instant success.

Many hams resented the new communication medium. This significant development was slow to take hold, and it was not until the mid-fifties that SSB was truly accepted on the HF amateur bands. The realization that SSB caused less TVI than AM and that it eliminated heterodynes was a deciding factor in boosting the new technique into the forefront of amateur radio.

Over the years the HF AM phone bands had become a zoo of heterodynes, especially on weekends. It was almost impossible to have a coherent QSO because of the annoying cacophony of carriers that filled the bands. SSB showed the way to eliminate this overpowering problem! Gradually, SSB conquered TVI and adjacent-carrier interference and AM operation was eventually eclipsed, but it was not an overnight happening.

In 1948 a struggle erupted between phone and CW operators over the division of the sub-bands. Various petitions were presented to the FCC by individuals, clubs and the ARRL. The timing was poor. The FCC had just completed a reorganization of itself, and the Amateurs Affairs Division in the new Safety and Special Services Bureau, flexing its muscles, asserted that the FCC itself, as well as radio amateurs, could redefine amateur radio.

And it did exactly that. After a confusing group of proposed rule-makings and abrupt reversals of position, the FCC in 1951 totally remade the amateur licensing structure. The old Class A, B and C licenses were replaced by the Advanced, General and Conditional class licenses (with a moratorium on issuing new Advanced Class licenses). The once-exclusive Class A phone bands on 75 and 20 meters were opened to General and Conditional class hams. And three entirely new license classes were created: Amateur Extra (which carried no additional operating privileges), Technician (with all amateur privileges above 220 MHz) and Novice, a one-year, non-renewable, entry-level license. Novices were required to use crystal-controlled transmitters with no more than 75 watts of power. They were given code privileges on small segments of the 80 and 11 meter bands and phone privileges on part of 2 meters.

There were dire predictions that the Novice license would ruin amateur radio, and a storm of protest erupted over the abolition of exclusive Class A privileges. *QST* reported that feelings ran eight-to-one in opposition. No matter, the new rules stood, creating a situation that would explode ten years

Joe's Journal *cont.*

for Eisenhower even though all the polls showed the election would be very close. CBS had the operators reprogram it to show a much closer race. Turns out the computer was right, though, and Ike beat Adlai Stevenson by a whopping 11 points. Score one for the computer!

If we ever want to travel in space, then computers are going to have to get smaller. Transistors may be a key here. A flying UNIVAC probably won't make it into orbit. And if it does, who's going to go up to change the tubes when they burn out? Space travel is still a ways off, but air travel is growing and promises to get faster soon. Back in 1949 the British introduced the first jet airliner, the Havilland Comet 1. It went into regular service in '52, but seemed to have trouble staying in one piece while flying. They were grounded after three of the planes broke up in flight. Boeing Aircraft has just brought out its Dash 80, a prototype for its first jet airliner. For now at least I'll stick to the train.

Not everything is changing fast. Baseball, for example, is still baseball. The only big changes on the diamond have been—most recently—when the Boston Braves moved to Milwaukee in 1953, and the St. Louis Browns packed up and became the Baltimore Orioles. "Joltin' Joe" DiMaggio retired from the Yankees in 1951, after leading the team to ten pennants and nine world championships. He's been replaced in center field by a promising youngster named Mickey Mantle. And speaking of promising youngsters, Jackie Robinson, the first Negro to play in the major leagues, is doing great. He was Rookie of the Year in '47, and was the National League's Most Valuable Player in 1949. He's got quite a future.

Race relations is another area of very slow change, but I have a feeling things may speed up in the decade to come. Whites and Negroes fought side-by-side in World War II and a Presidential Committee on Civil Rights urged Congress to pass stronger laws to end segregation. When Congress refused to act, President Truman ordered the armed forces, and the federal government fully integrated. And just last year, the Supreme Court ruled unanimously that "separate but equal" schools—different schools for different races—were *not* equal and were unconstitutional. It's awfully hard to change people's attitudes, though. So, while it looks like change is coming, chances are it won't be quick and it won't be easy. We'll just have to wait and see.

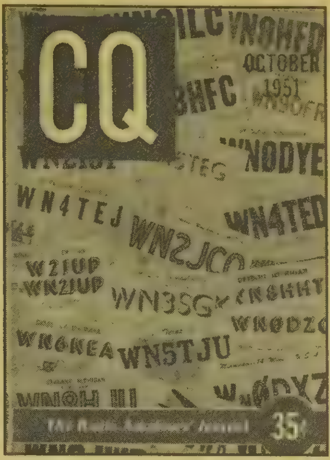
(Researched & Written by Richard S. Moseson, NW2L)

[1] Notes on references are at the end of the final article in this series.

later in the so-called "incentive licensing" proposal.

On the brighter side in 1951, *CQ*'s propagation column returned after a 15-month absence, edited by George Jacobs, W2PAJ, now W3ASK. George's column is still running in *CQ*, over 44 years later!

In 1951 W2AEF described his mobile transmitter and receiver, jewel boxes that challenged the best in the home builder. Clamp-tube modulation flourished briefly and was relegated to the sideline. And in the summer of 1951, W6SAI, F7AR (now W8AH), SM5UM and ON4QF went on a DXpedition to Andorra, establishing the first-ever amateur radio station in that country (7B4QF).



A Lingering Goodbye to Ancient Modulation

In the early 1950s good old AM/CW was still king, and this traditional communication mode was given tremendous impetus by the advent of the Viking 1 transmitter kit by E.F. Johnson Company. It was accompanied by another popular transmitter, the Collins 32V, which brought a new order of frequency stability to the variable frequency oscillator.

For the increasing number of mobile-minded hams, Gonset announced its famous converter for 10 meter operation! Hallicrafters, Hammarlund, National and RME were now in the market in force, after overcoming the surplus gear "shock" which nearly decimated them. The Heath Company entered the amateur radio market in 1955, eventually producing its most famous kit, the DX 100 transmitter.

It was well-known that SSB was an effective way of reducing or eliminating TVI. The AM transmitter, however, was still the choice of the great majority of hams.

Low-pass TVI filters for coax lines were now available on the market and that helped a critical situation. Many hams were switching over from open-wire transmission lines to coax and new transmitter designs made use of the novel pi-network output circuit.

By 1950 the problems causing TVI were well understood, and various solutions filled many pages of ham radio magazines. There seemed to be "light at the end of the tunnel."

SSB After All

It was a hard sell, but gradually SSB became the accepted means of voice transmission. By 1953 a modest amount of SSB gear was on the market. The Central Electronics 10A phasing exciter was a pioneer. This popular unit was soon followed by other SSB rigs, as manufacturers saw the new technique slowly taking hold. The change was keynoted by Collins Radio, which introduced the KWS-1 transmitter in 1955, a milestone in the new order of things. Hallicrafters, Heath, B&W, Eldico, Johnson and others came on the market with SSB receiving and transmitting equipment. The SSB transceiver, however, was still in the future.

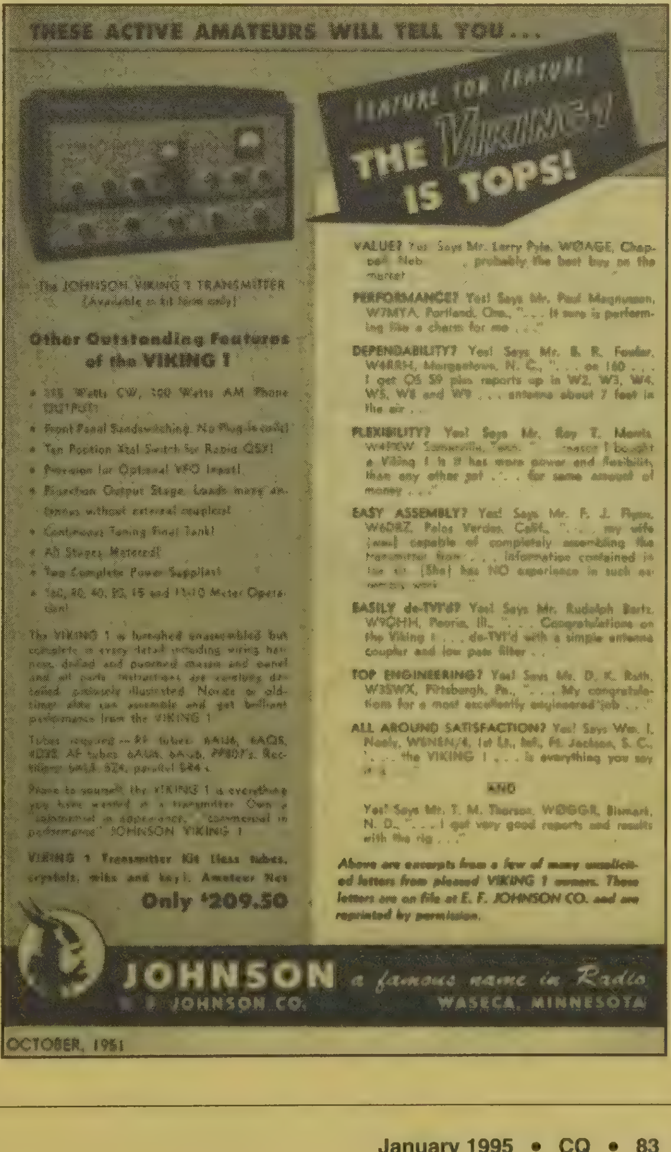
Build-it-yourself types converted the surplus SCR 274-N transmitters into SSB phasing exciters. During 1954 filter-type rigs using surplus FT-141 crystals appeared on the ham bands. Both *CQ* and the ARRL brought out sideband handbooks, which helped clear the air of the mystery that surrounded SSB in many hams' minds.

In 1953 *CQ* ran a series of articles, "Getting Started on SSB," by W3SHY. The series explained many of the mysteries of the new mode of transmission to those contemplating a change in operation. While SSB still was not a household word among the majority of hams, the instant success of *CQ*'s *Single Sideband Techniques* suggested that the new communication mode was gaining momentum.

On the VHF horizon '54 brought exciting news that 1000 mile contacts were possible on 144 MHz, showing the value of multi-element beams and sensitive, low-noise receivers!

Go Mobile!

The popularity of mobile operation grew rapidly after 1950. Cheap war-surplus dynamotors were on the market, and effi- →


THESE ACTIVE AMATEURS WILL TELL YOU . . .

FEATURE FOR FEATURE THE VIKING 1 IS TOPS!

The JOHNSON VIKING 1 TRANSMITTER
(Available in kit form only)

Other Outstanding Features of the VIKING 1

- 115 Watts CW, 100 Watts AM Phone OUTPUT!
- Front Panel Bandswitching. No Plug-in coils!
- Ten Position Xtal Switch for Rapid QSY!
- Provision for Optional VFO Input!
- Pi-section Output Stage. Loads many antennas without external couplers!
- Continuous Tuning Final Tank!
- All Stages Metered!
- Two Complete Power Supplies!
- 160, 80, 40, 20, 15 and 11-10 Meter Operation!

VIKING 1 Transmitter Kit (less tubes, crystals, mike and key). Amateur Net Only $209.50

VALUE? Yes! Says Mr. Larry Pyle, WØAGE, Chappell, Neb. . . . probably the best buy on the market

PERFORMANCE? Yes! Says Mr. Paul Magnusson, W7MYA, Portland, Ore., ". . . It sure is performing like a charm for me . . ."

DEPENDABILITY? Yes! Says Mr. B. R. Fowler, W4RRH, Morgantown, N. C., ". . . on 160 . . . I get QS 59 plus reports up in W2, W3, W4, W5, W8 and W9 . . . antenna about 7 feet in the air . . .

FLEXIBILITY? Yes! Says Mr. Roy T. Morris, W4PKW, Somerville, Tenn. ". . . reason I bought a Viking 1 is it has more power and flexibility than any other set . . . for same amount of money . . ."

EASY ASSEMBLY? Yes! Says Mr. F. J. Flynn, W6DRZ, Palos Verdes, Calif., ". . . my wife [was] capable of completely assembling the transmitter from . . . information contained in the kit. [She] has NO experience in such assembly work

EASILY de-TVI'd? Yes! Says Mr. Rudolph Bartz, W9QHH, Peoria, Ill., ". . . Congratulations on the Viking 1 . . . de-TVI'd with a simple antenna coupler and low pass filter . . ."

TOP ENGINEERING? Yes! Says Mr. D. K. Rath, W3SWX, Pittsburgh, Pa., ". . . My congratulations for a most excellently engineered job . . ."

ALL AROUND SATISFACTION? Yes! Says Wm. I. Neely, W5NEN/4, 1st Lt., Inf., Ft. Jackson, S. C., ". . . the VIKING 1 . . . is everything you say it is . . ."

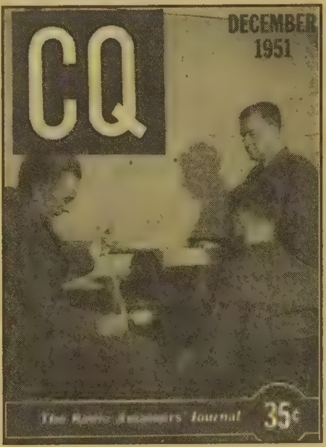
AND

Yes! Says Mr. T. M. Thorson, WØGGR, Bismark, N. D., ". . . I got very good reports and results with the rig . . ."

Above are excerpts from a few of many unsolicited letters from pleased VIKING 1 owners. These letters are on file at E. F. JOHNSON CO. and are reprinted by permission.

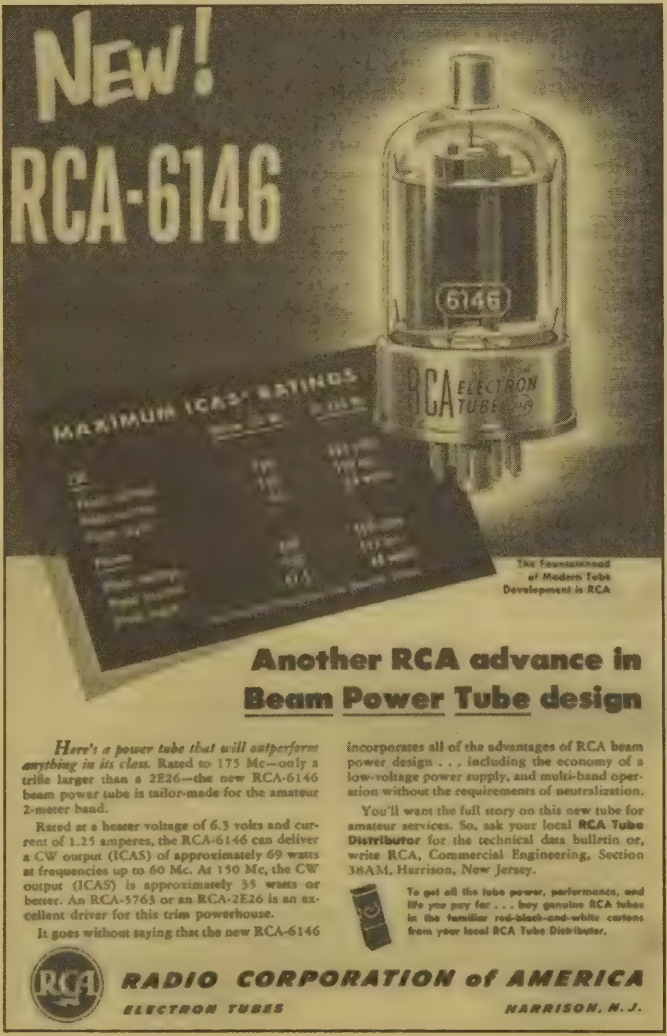
JOHNSON a famous name in Radio
E. F. JOHNSON CO. WASECA, MINNESOTA

OCTOBER, 1951



Ham Radio History *cont.*

cient, loaded-whip antennas for 80 and 160 meter mobile service were available. *CQ* brought out the *Radio Amateur's Mobile Handbook* (W6SAI, author), which covered all aspects of this new phase of operation. The handbook described, among other rigs, a 300 watt, multiband AM rig using 4-65As modulated by 811s, all run off a fanbelt-driven surplus dynamotor! This was the forerunner of many high-power mobile installations, which eventually reached the kilowatt level!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RCA ELECTRON TUBE
MAXIMUM ICAS RATINGS
The Fountainhead of Modern Tube Development is RCA

NEW!

RCA-6146

Another RCA advance in Beam Power Tube design

Here's a power tube that will outperform anything in its class. Rated to 175 Mc—only a trifle larger than a 2E26—the new RCA-6146 beam power tube is tailor-made for the amateur 2-meter band.

Rated at a heater voltage of 6.3 volts and current of 1.25 amperes, the RCA-6146 can deliver a CW output (ICAS) of approximately 69 watts at frequencies up to 60 Mc. At 150 Mc, the CW output (ICAS) is approximately 35 watts or better. An RCA-5763 or an RCA-2E26 is an excellent driver for this trim powerhouse.

It goes without saying that the new RCA-6146 incorporates all of the advantages of RCA beam power design . . . including the economy of a low-voltage power supply, and multi-band operation without the requirements of neutralization.

You'll want the full story on this new tube for amateur services. So, ask your local **RCA Tube Distributor** for the technical data bulletin or, write RCA, Commercial Engineering, Section 38AM, Harrison, New Jersey.

To get all the tube power, performance, and life you pay for . . . buy genuine RCA tubes in the familiar red-black-and-white cartons from your local RCA Tube Distributor.

RADIO CORPORATION of AMERICA
ELECTRON TUBES **HARRISON, N.J.**

In *CQ* W2AEF described a series of miniature "Converterettes" for the HF bands. Connect one to your car radio and you had a fine amateur band receiver!

In the VHF field, use of the 220 MHz band was rising in metropolitan areas, due chiefly to the surplus BC-625 transponder which could be modified for AM operation on that band. The ASB-5 radar receiver was a popular unit for the few experimenters working on the 440 MHz band.

VHF mobile operation also grew in popularity in the post-war years. New circuits and crystal-controlled transmitters, combined with compact, low-noise converters, preamplifiers and receivers provided improved communication, ready for the advent of the VHF repeater, which was still over the horizon.

KV4AA took over *CQ*'s DX column in 1952, succeeding Herb Becker, W6QD, who started the column in 1946. (It was *CQ*'s first regular column.) Almost as an afterthought, *CQ* featured an article adapting the Viking II transmitter as a linear amplifier for the Central Electronics 10A exciter.

The VHF Horizon Expands

In 1946–47, when the new 50 and 144 MHz ham bands became available, improved beam antennas were at hand, coupled with a rising sunspot cycle. Six meter DX included trans-Atlantic contacts between Europe and both North and South America, and all pre-war VHF distance records were quickly broken. Crystal-controlled transmitters became the norm on 2 meters, and the miniature 6AK5 tube provided vastly improved receiver performance. Soon the grounded-grid and cascode low-noise RF amplifiers would sweep the 6AK5 into the dustbin!

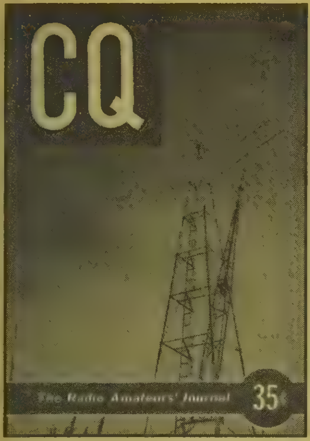
Late in 1947 amateur teletype was introduced on the 2 meter band with a contact between W2BFD and W2AUF. Frequency-shift keying was a novel concept introduced into amateur radio.

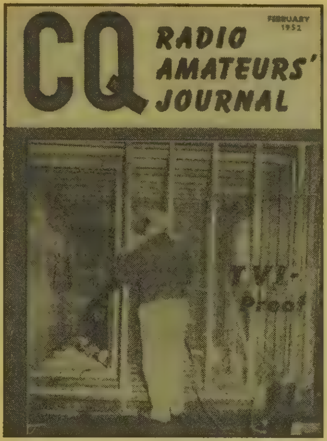
The great excitement, however, centered around VHF DX. In the fall of 1947, for example, 50 MHz was open from the east coast to Europe for days in a row! CE1AH (Chile) worked J9AAO (Okinawa), a distance of about 10,500 miles—nearly half-way around the globe! On 2 meters the DX record was stalled at 650 miles, on 235 MHz it was 210 miles and on 420 MHz it was 186 miles. Exciting, to be sure, but no one had any idea of what lay ahead for the VHF bands! Meanwhile, crystal control was designed into 220 MHz gear in some advanced stations.

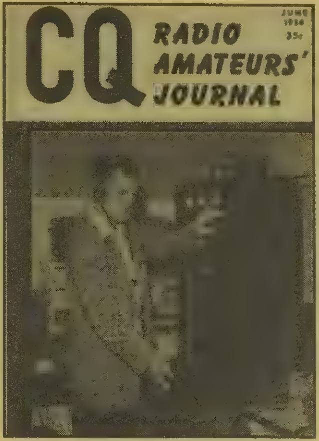
In 1955 the VHF amateur got a valuable asset: the Gonset 6 and 2 meter "Communicators." These compact AM transceivers were an instant hit and populated the VHF bands for a decade, until they were eclipsed by the eventual turn to SSB. Six meter DX activity was accelerated by the popular "five over five" stack of Yagi antennas, and big beams were also appearing on 144 and 220 MHz. And some SSB exciters were even showing up on 144 MHz!

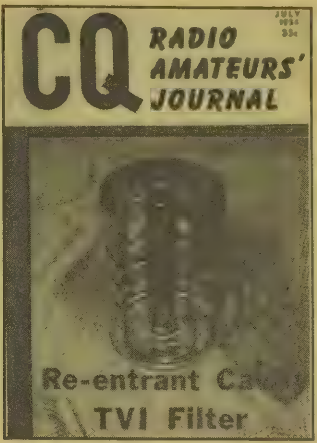
Public Service

One prime effort of very early amateur radio was relaying messages across the United States. Relay trunk lines were established by the ARRL in the early '20s and flourished well into the '30s, when more conventional means of long-distance communication became commonplace. Even up to the present time, as evidenced by the ARRL National Traffic System, the Public Service Honor Roll and the Brass Poun-









der's League, the honored tradition of message-handling and public service continues to flourish.

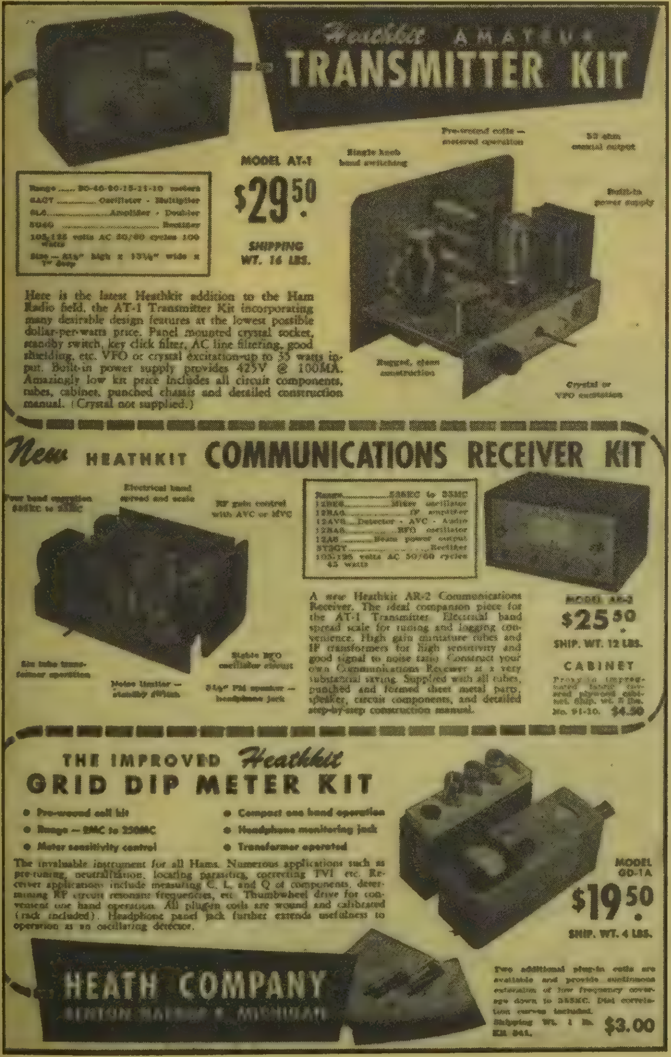
Running like a golden thread through the tapestry of amateur radio, the ability of hams to serve the public is woven into the history of the post-war years. At the end of World War II over 25,000 amateurs had served in the Armed Forces and an equal number were employed in the war industries.

The War Emergency Radio Service (WERS), a branch of Civil Defense, paved the way for post-war emergency communication on a local level. ARRL Emergency Coordinators were appointed, with close ties to the American Red Cross and local Civil Defense units. Gradually, hams equipped themselves with surplus generators and portable communication equipment for use in natural and man-made disasters.

Two of the first tests of emergency radio were the 1946 Alaska earthquake and the 1947 Texas City explosion. These established amateur emergency services as a national asset. The 1950 New England hurricane and the 1952 Ohio River flood resulted in large volumes of emergency radio traffic relayed by amateurs. These floods, hurricanes, fires and earthquakes emphasized the necessity of voluntary emergency communications, supplied in part by individuals, clubs and ARRL traffic nets.

Toward the Future

Many hams learned about the transistor from a short article in the October 1948 issue of *QST*. Describing the Bell Telephone Laboratories invention, the article concluded that "it doesn't appear that there will be much use made of Transistors in amateur work . . . the noise figure is said to be poor compared to that obtainable with vacuum tubes." But the article stated hopefully that "these clever little devices are well worth keeping an eye on." As 1954 came to a close in the world of amateur radio, however, the vacuum tube was still king. ■


Heathkit AMATEUR TRANSMITTER KIT

MODEL AT-1
$29.50
SHIPPING WT. 16 LBS.

Here is the latest Heathkit addition to the Ham Radio field, the AT-1 Transmitter Kit incorporating many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, standby switch, key click filter, AC line filtering, good shielding, etc. VFO or crystal excitation-up to 35 watts input. Built-in power supply provides 425V @ 100MA. Amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis and detailed construction manual. (Crystal not supplied.)

New HEATHKIT COMMUNICATIONS RECEIVER KIT

A new Heathkit AR-2 Communications Receiver. The ideal companion piece for the AT-1 Transmitter. Electrical band spread scale for tuning and logging convenience. High gain miniature tubes and IF transformers for high sensitivity and good signal to noise ratio. Construct your own Communications Receiver at a very substantial saving. Supplied with all tubes, punched and formed sheet metal parts, speaker, circuit components, and detailed step-by-step construction manual.

MODEL AR-2
$25.50
SHIP. WT. 12 LBS.

CABINET
No. 91-10. $4.50

THE IMPROVED Heathkit GRID DIP METER KIT

- Pre-wound coil kit
- Range — 2MC to 250MC
- Meter sensitivity control
- Compact one hand operation
- Headphone monitoring jack
- Transformer operated

The invaluable instrument for all Hams. Numerous applications such as pre-tuning, neutralization, locating parasitics, correcting TVI etc. Receiver applications include measuring C, L, and Q of components, determining RF circuit resonant frequencies, etc. Thumbwheel drive for convenient one hand operation. All plug-in coils are wound and calibrated (rack included). Headphone panel jack further extends usefulness to operation as an oscillating detector.

MODEL GD-1A
$19.50
SHIP. WT. 4 LBS.

Two additional plug-in coils are available and provide continuous extension of low frequency coverage down to 355KC. Dial correlation curves included. Shipping Wt. 1 lb. $3.00

HEATH COMPANY
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Single knob band switching
Pre-wound coils — metered operation
52 ohm coaxial output
Built-in power supply
Rugged, clean construction
Crystal or VFO excitation
Electrical band spread and scale
RF gain control with AVC or MVC
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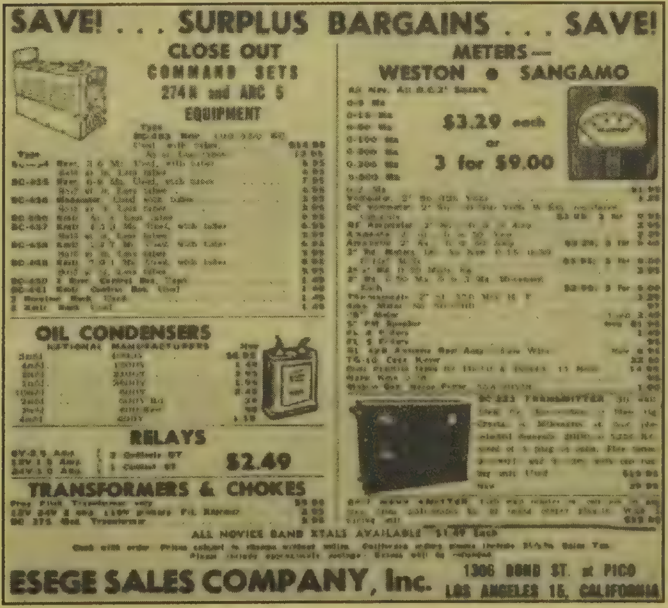
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1955–1964: Single Sideband, Sputnik and JFK

CQ's second decade was marked by a relatively quiet world scene—there was the Cold War, but the U.S stayed out of the hot ones. Here at home we entered a new political era with the election of President Kennedy and the birth of the Civil Rights movement. But we hams were more interested in either embracing or resisting SSB, and in listening to the beeps we tuned in not only from Sputnik, but from our very own OSCAR 1. Bill Orr continues his look at ham radio history, "Joe" looks back at world events in his "journal" and we hear from a variety of *CQ* veterans about how our magazine helped focus our hobby.

Ham Radio History 1955–1964:

The Flowering

By Bill Orr, W6SAI

The second half of the 1950s launched a period of unparalleled technical change in amateur radio. Before the next decade was out, single sideband and solid-state design would be firmly entrenched, VHF repeaters would be on the scene and ham radio would even be in space! It was an exciting time to be a ham!

Surplus Dies Out Slowly

World War II surplus equipment gradually disappeared from the ham marketplace. What was left was either expensive or of no use. The gap was filled in the mid-50s by the slowly-accelerating growth of SSB. Eldico and Lakeshore Industries advertised SSB exciters and linear amplifiers. SSB adapters and generators were popular as add-ons to AM gear and the famous 75A4 SSB receiver was announced by Collins Radio Co. In 1956, National Company brought out the NC-300 receiver and the SSB enthusiasts welcomed the Eldico SSB-100 transmitter, which was especially popular on 80 meters.

At the same time, W6GEG pioneered the grounded grid linear, showing a kW amplifier with a pair of 803s in a popular *CQ* article. Some mobile SSB stations appeared on 80 and 20 meters! Amazing!

Meanwhile, a new breed of surplus equipment slowly appeared on the ham market: obsolete Motorola FM gear that could be reworked to the 6 or 2 meter band. The combination of noise-free reception and a receiver squelch was a vast improvement over conventional AM. Perhaps there was something in VHF FM!

In 1955, *CQ* brought back its monthly VHF column, which had appeared on and off (mostly on) since 1946. The new VHF editor was Sam Harris, W8UKS, later W1FZJ. One column described a 24-element 2-meter array, using six 4-element Yagis. A veritable monster beam!

HF DXers were excited by the introduction of the W3DZZ

Joe's Journal

January 1965

It's hard to believe that another ten years have passed. But they have, and that means it's time for another look back at the events that shaped our world in the past decade.

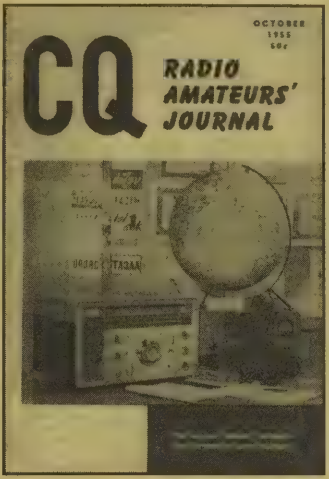
The world of 1965 is far different from the world of 1955. Our nation is different, too. It has 50 states now, with the admission of Alaska and Hawaii in 1959. Perhaps the most significant change of the past decade, in my view, is that we've discovered that technology is a two-edged sword. The very same technology that has let us put men into space has also let us build nuclear missiles which daily threaten our very existence.

The Space Age began with a roar—and a beep—on October 4, 1957. We hams were among those privileged to listen in directly on the first signals from the first manmade satellite. But those beeps from space had a Russian accent. It was a rude awakening for America's fledgling space program (many of the scientists of which were German rocket pioneers spirited into the United States after World War II). The first American satellite, Explorer I, was launched about three months after the Soviets launched their "Sputnik," and the Space Race was off and running.

In 1959 the Soviets sent three rockets to the moon, including one that returned the first-ever pictures from the dark side of the moon. The U.S. responded the following year by launching the first weather satellite (TIROS I) and the first passive communications satellite (Echo I), followed by the Venus probe, Mariner II, which became the first manmade object to travel to another planet.

The Soviets upped the ante dramatically on April 12, 1961, when Yuri Gagarin became the first man to fly in space. He made a single orbit during the one-hour, 48-minute trip. Less than a month later American Alan Shepard was launched on a suborbital flight. But it was nearly a year before John Glenn became the first American to orbit the Earth. Then in 1963 cosmonaut Valentina Tereshkova became the first woman to fly in space. The U.S. hasn't matched that one yet.

American business is also interested in space. In 1962 Bell Labs built and launched Telstar, the first "active" communication satellite (it amplifies received signals as it retransmits them). For the first time live TV pictures could be sent between the U.S. and Europe, but only during 20-minute "windows" when the satellite was in view of both continents.



"tribander", the first of a multitude of trapped dipole and Yagi arrays for the 20-15-10 meter bands. Antennas were now a big-time business!

1956: Enter the Transistor

Unlike the vacuum tube, which took over a decade to become a practical and reliable device, the transistor overwhelmed the communication industry in a few short years. Simple transistorized circuits, such as speech amplifiers, modulators, keyers, and dip-oscillators, foretold the future: tubes were out; solid-state was in.

A design series featuring the use of transistors and printed circuit boards was written by W4UHN and ran in *CQ* during 1956. And almost as an afterthought, a few articles on using the Model 15 teletypewriter for amateur RTTY were included in *CQ*. Experiments in narrow-shift RTTY on the HF bands were started by some stations.

An interesting product was the new Regency ham-band

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The new Syncom satellites get around that problem. They're orbiting 22,300 miles above the equator—where a single orbit takes 24 hours—making it seem like they're stationary in the sky. The opening ceremony of the 1964 Olympics in Tokyo was broadcast live to the U.S. via Syncom 3.

President Kennedy set a goal for the nation of landing a man on the moon before 1970, and we've already gotten back detailed photos from Ranger 7, which will help us pick a landing site.

Speaking of President Kennedy, he is, of course, one of the decade's major stories—the first Roman Catholic ever elected President (in 1960); his stirring inaugural address in which he implored Americans to "ask not what your country can do for you; ask what you can do for your country"; and his tragic death by an assassin's bullet just over a year ago (November 22, 1963).

Lyndon Johnson is President now. As Kennedy's Vice-President, he took the oath of office on an airplane after JFK was assassinated. Then he won election in his own right just two months ago, in a landslide over Arizona Senator Barry Goldwater, who also happens to be K7UGA. I'm still trying to picture the White House with a tower and a beam!

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CQ's "Guiding Lights"

_CQ_ Editors, 1955–1964

Wayne Green, W2NSD: Feb. 1955 – Feb. 1960
Barry Briskman, K2IEG, Managing Editor: Mar. 1960 – Oct. 1960
Arnold Trossman, W2DTJ: Nov. 1960 – June 1964
Dick Ross, K2MGA: July 1964 – Mar. 1976

Arnold Trossman, W2DTJ, *CQ* Editor, 1960-64.

CQ's second decade saw continuity, if not stability, at the editor's desk, as each departing editor was succeeded by his assistant. Wayne Green's five years at the helm set a longevity record that wouldn't be broken for another decade.

"I started on January 5, 1955," Green recalls. "Since building was my main interest, I decided to get the magazine back into supporting building, much as the old *Radio* had done. . . . Since I also loved contests, I resurrected the *CQ* World-Wide DX Contest, which Perry (Ferrell) had let die, and got Frank Anzalone (W1WY) to run it." (For more of Wayne's reminiscences about *CQ*, see "RTTY, Building and Contests" on the next page.)

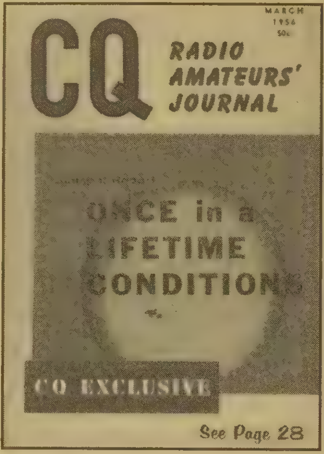
But Wayne Green was as controversial 35 years ago as he is today. And he was fired five years to the day after he was hired. His assistant editor, Barry Briskman, replaced him briefly, as Managing Editor, but then left several months later.

Arnold Trossman, W2DTJ, was Briskman's assistant and succeeded him. "I was editor at a very crazy time in (*CQ*'s) life," says Trossman, noting that the magazine suddenly had to deal with competition from its own former editor after Green started *73*. "It wasn't the best of times. But I enjoyed doing it. It was a lot of fun. . . . We started up the USA-CA column (for county hunters) . . . And Bill Scherer, W2AEF, who worked for the Voice of America, wrote up all of our new products. We had a little lab and took our own photographs. It was great!"

Dick Ross, K2MGA, owns and publishes *CQ* today. But in the early '60s, he was Arnold Trossman's assistant editor. "Trossman was a sound, stabilizing influence on the magazine," Ross notes. "He was clearly the best editor of that decade."

Ross also has fond memories of Bill Scherer: "Bill was the most accomplished electronics technician I've ever had the pleasure to meet. As a builder and experimenter myself, it was an extraordinary honor to work with a person of Bill's caliber." (See the accompanying article, "Always the Gentleman, Always Seeking Perfection," to learn more about Bill Scherer.)

In 1964 the Cowans decided to move *CQ*'s offices to Port Washington, New York, on Long Island. Trossman, who had just bought a house on the other side of the Hudson River, opted to leave rather than move again or face the long commute. Once again, the assistant editor moved up. Dick Ross took *CQ*'s helm just as it was heading into its third decade.



Ham Radio History *cont.*

converter for mobile service. This was one of the first transistorized receivers that won popular approval from hams. Perhaps there was something practical to these mysterious little devices with the funny numbers!

On the technical side, the transistor and circuit board were here to stay. Everything was slowly coming together. The switchover to solid state would soon be accelerated by the demands of SSB. A complex, transistorized, 100-watt exciter could be placed in a desk-top cabinet; the equivalent tube-type equipment would fill a small relay rack! These were the dreams of the circuit engineers.

A milestone in the advance of SSB was reached in 1957 when the Institute of Radio Engineers (IRE) devoted a whole issue of its *Proceedings* to single sideband. Interestingly, the majority of articles in that issue were written by engineers (hams) of Collins Radio Company!

During 1957, simple transistor projects appeared in *CQ* and *QST*, but larger, sophisticated solid-state gear such as receivers and exciters were still on the horizon. Equipment was loaded with vacuum tubes. Hams were familiar with radios that glowed, but time was running out, as better and cheaper transistors appeared on the market. Printed circuit technology pointed the way to reliable and economic assem-

RTTY, Building and Contests

By Wayne Green, W2NSD

Most hams today recognize Wayne Green, W2NSD, as ed tor of another amateur radio magazine (we can't rememb its name right now). From 1951 to 1960, however, Wayne wa part of the CQ family, first as a columnist and then as edito He was kind enough to share with us his recollections of thos days gone by.

It was my interest in RTTY (radioteletype) that got me int publishing, with *Amateur Radio Frontiers* in 1951, while I wa a TV producer-director at WXEL in Cleveland. Having worke with Perry Ferrell on his 50 MHz propagation study before h became the editor of *CQ*, I sent him copies of my publicatio This led to my running an RTTY column in *CQ* starting i December 1951.

I'd moved back to New York to start a loud speaker manufacturing business, so I got to be good friends with Perr When Perry left to become editor of *Popular Electronics*, tha left *CQ* without an editor. Cowan called me to see if I'd tak over. My manufacturing business was going great guns, bui up under my management in four years from $1000 borrowe on my car to $2 million (in 1955 dollars!) in sales. My partne who'd invented the basic technology but hadn't been involve in the business otherwise, wanted to take over the marketin and live the good life, so since the business was runnin smoothly, I decided to give the *CQ* editorship a try.

From The Past To The Future—And A Trip Around It

If you think Arthur C. Clarke had a clear vision of the future back in 1945 (see "Communications Prophet" page 79), consider the prophecies of his fellow science-fiction writer Jules Verne.

Any reader of Verne's work knows that he accurately predicted the development of submarines (*20,000 Leagues Under the Sea*) and of space travel (*From the Earth to the Moon, and a Trip Around It*). A newly discovered manuscript (from 1863), however, shows just how accurate—and detailed—his powers of prediction were.

The manuscript is entitled *Paris in the 20th Century*, and it looks at life as Verne foresaw it in 1963. Its recent discovery was reported last September by the Washington *Post* News Service. According to the report, Verne described how people would get around in the Paris of 1963 (remember as you read this that he wrote it 25 years before the first automobile was built): "Of the innumerable vehicles that wound their way along the boulevards, the vast number operated without horses. An invisible force with a gas-powered motor made them move. It was simple and easy to handle. The driver, sitting on a seat, used a steering wheel and a pedal at his feet to change the speed of the vehicle instantly."

The news report says Verne also predicted elevated train similar to today's monorails, the electric chair for execution ("What a sinister sight!") and the everyday use of the telephone and fax machine. "Photo-telegraphy allowed any writ ing, signature or illustration to be sent far away, and any contract could be signed and exchanged" over a distance o up to 12,000 miles.

But Verne also foresaw the future as a rather bleak and unenlightened place in which much of the population is addicted to technology, classical culture is ignored and "the beautiful French language is lost."

Where has *Paris in the 20th Century* been for most of the 20th century? Locked in a strongbox, which is where Verne put it after getting it back from his publisher with the notation, "You took on an impossible task, and you did not pull it off. Nobody will ever believe your prophecies."

Verne's great-grandson discovered the manuscript in 198 and it was published last year by Hachette/Le Cherche Midi.

—NW

It only took my partner seven months to put our wildly successful speaker business into bankruptcy. Oh well, hard come, easy go.

At the time I stepped in, *CQ* was being supported by *Radio, Television Service Dealer,* another of Cowan's publications. I started on January 5, 1955. Since building was my main interest, I decided to get the magazine back into supporting building, much as the old *Radio* had done. Within six months we were in the black and had expanded to 128 pages.

Since I also loved contests, I resurrected the CQ World-Wide DX Contest, which Perry had let die, and got Frank Anzalone, W1WY, to run it. I brought in Sam Harris, W1FZJ/W1BU, as the VHF editor. He was one of the first moonbouncers and the inventor of the parametric amplifier, the gadget that helped make Microwave Associates (MA/COM) rich.

The magazine got me involved with DXpeditions, too, with my first to Navassa as KC4AF in 1958. Six of us almost got killed a couple of times on that one, once by a hurricane and then by the police on Haiti! The next year I talked myself into Operation World Wide, where I visited 24 countries and operated on 20 SSB aboard the plane as we flew around the world. Tough job.

My surplus editor, Ken Grayson, W2HDM, who was into sports cars (an MGB), spent a lot of time at my house, so naturally I got hooked. In late 1957 I bought a Porsche Speedster and joined the Porsche Club of America. The next thing I knew, I'd been elected president.

As president of the club I helped organize a flight in 1958 to the factory in Stuttgart, where around 120 Porsche fanatics bought new cars at the factory. I picked up one for a friend and drove it all over Europe before shipping it back to him (that was part of the deal). On my trip I stopped in Geneva and got to know the Chairman of the ITU (International Telecommunications Union), who was an American ham, and the General Manager, who was another ham. He insisted I volunteer to help represent America at the 1959 conference.

Sure enough, the State Department asked me to represent American amateurs at the ITU Geneva Plenipotentiary Conference. That was when we came within an eyelash of losing all our amateur bands. It was just an incredible lucky fluke that saved us.

Then a few months later, on January 5, 1960, Cowan fired me. That's a long story; but I preferred working for myself, so I wasn't upset over being fired. I tried my hand with an advertising agency for a few months, but I hated it, so I decided to start my own ham magazine. When none of the rich hams I approached were interested in funding it, I sold my Porsche, my boat and my plane and got just barely enough to print the first issue of *73.*

I enjoyed my five years as editor of *CQ*. I didn't make much money, but I had fun and learned a lot. But then, few people make much money in the ham radio business. And what a kick it is "working" in your major hobby. I also discovered that publishing a magazine is mainly an endless series of crises. I love it.

bly of communication equipment. The changeover in design was foreshadowed by the Hallicrafters FPM-200 solid state transceiver. Although not a commercial success, it led the way to solid-state SSB equipment, eventually to reach the market.

Meanwhile, the slow march toward SSB continued, but not without resistance. Sidebanders restricted themselves to the edge of the phone bands and AM occupied the greater portion of the spectrum. Some hams modified their transmitters for suppressed-carrier AM, but that idea faded after a year

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Joe's Journal *cont.*

It's too early to know how history will judge President Kennedy. He certainly brought new style, energy and excitement to Washington after eight years of the nice-but-dull Eisenhowers. And he successfully stared down the Russians when they tried to build a missile base in Cuba, just 90 miles from Florida. But he also approved the badly-bungled Bay of Pigs invasion, in which CIA-trained Cuban exiles planned to overthrow Fidel Castro, Cuba's Communist dictator. The Cubans were tipped off and the entire invasion force was captured. (They were later released.)

And Cuba's not the only place where we've gone head-to-head with the Russians or their Communist allies in the past decade. They've even gone head-to-head with each other. In 1956 a revolt broke out in Communist Hungary, and the Soviets sent in troops and tanks to maintain their control. To keep Communism from spreading further, President Eisenhower offered U.S. aid to middle eastern countries that resisted armed Communist aggression (the Eisenhower Doctrine, 1957).

"Ike" was embarrassed in 1960, though, when the Russians shot down a high-flying American U2 spy plane and captured its pilot, Francis Gary Powers. Eisenhower had been insisting that we weren't spying on the Soviets. Powers was sentenced to ten years in prison, but was freed in 1962 in exchange for a Soviet spy.

You didn't need spies to know that thousands of Eastern Europeans couldn't tolerate the oppression of Communism. The flood of refugees seeking asylum in West Berlin grew so great by 1961, that in the middle of one August night East German troops built a fortified concrete wall between the two halves of the divided city and started shooting anyone who tried to climb across. JFK visited the city soon afterward and declared on behalf of the entire free world, "Ich bin ein Berliner" ("I am a Berliner"). The west took no action against the Soviets, however, and the Berlin Wall still stands today.

Communist aggression also continued in Southeast Asia. Ten years ago I wrote here of a little-known country called Vietnam, where Presidents Truman and Eisenhower had both sent U.S. military advisors to help block Communist advances. They were supposed to stay only until elections were held to reunite North and South Vietnam. Only trouble is, those elections—planned for 1956—have never been held. And now there's full-scale war.

The 35 U.S. advisors sent to Vietnam by President Truman in 1950 had become nearly 350 by 1960, when

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CQ in the Space Age

By George Jacobs, W3ASK

In addition to editing CQ*'s propagation column for the past 44 years, George Jacobs, W3ASK, was a pioneer in the development of the amateur radio OSCAR satellites and the formation of AMSAT. For many years, George was also editor of* CQ*'s "Space Communications" column.*

All of us in amateur radio were very excited over the Soviet launching of the first Sputnik satellite in October 1957. Shortly after the Sputnik launch, Don Stoner, W6TNS, in a classic article in *CQ*, challenged radio amateurs to develop and have launched for them a piggy-back radio amateur satellite. An outstanding group of licensed radio amateurs living in California, including some of America's leading satellite engineers and scientists at the time, formed the OSCAR committee in 1959 to meet this challenge. The name was derived from *Orbiting Satellite Carrying Amateur Radio*. I joined the OSCAR team as publicist and government contact. This gave birth to *CQ*'s "Space Communications" column, which made its debut in December 1960 and appeared monthly for six years. This was another first for *CQ*, for no other publication took OSCAR seriously then.

One of my biggest thrills in amateur radio was the successful launch of OSCAR-1 on December 13, 1961. I still "tingle" today as I recall hearing the satellite's beacon peep out *HI* from space in the 2 meter band.

A second OSCAR beacon satellite was successfully launched in 1962. On March 9, 1965, OSCAR-3, the first amateur radio two-way communication satellite, was launched successfully. Amateur radio had now truly entered the age of space communications. OSCAR-3 made history

George Jacobs, W3ASK, and Bill Orr, W6SAI, holding the OSCAR-1 satellite shortly before its December, 1961 launch. Both George and Bill still write regularly for CQ.

Joe's Journal *cont.*

South Vietnam asked for twice that number. By the time John Kennedy took office in 1961, the number had grown to 2,000. Three years later, we had 15,000 "advisors" there—with permission to return fire if they were shot at. Then last year two U.S. destroyers were fired on in the Gulf of Tonkin, off the coast of North Vietnam. Congress gave President Johnson authority to "take all necessary measures to repel any armed attack against the forces of the United States and to prevent further aggression." By the end of 1964 we had 23,000 men in Vietnam. They're no longer just "advisors." And Vietnam is no longer a "little-known country."

There was more fighting in the Middle East this decade. In 1956, after Egypt nationalized the Suez Canal, Israel invaded the Sinai Peninsula. The Israelis were backed up by British and French troops, which landed in Egypt to try to take control of the canal. Under intense pressure from the U.S. and the U.N., a cease-fire was signed. But once again, there's been no peace treaty and the Mideast tinderbox could explode again at any time. And it wasn't only the Arabs and Israelis who have been fighting. Civil war broke out in Lebanon in 1958, and U.S. Marines were sent to help restore order.

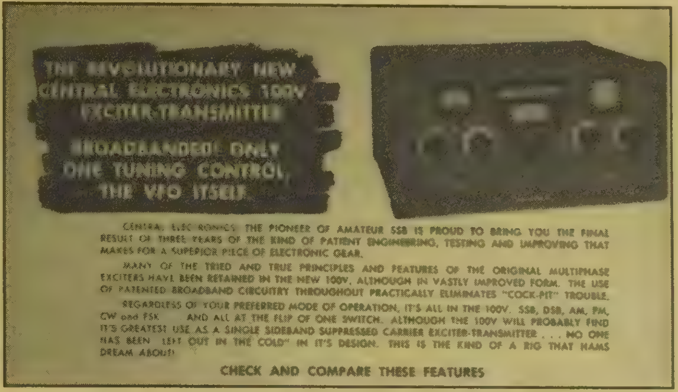
About the only positive thing to report on the military front in the past ten years is that the U.S., the Soviet Union and more than 100 other countries signed a treaty banning nuclear weapons tests in the atmosphere and underwater. The treaty still allows underground tests, though, and all of the nuclear powers (now including China) are continuing to conduct them. The chance of accidental nuclear war has been significantly reduced by the installation of a "hotline" between Washington and Moscow in 1963. While many people have visions of a special red telephone on the President's desk, the hotline is actually a teletype link.

The power of the atom is finding uses beyond bomb-building. A few power plants are using nuclear reactions to generate electricity; and the nuclear-powered submarine, *USS Nautilus*, made history in 1958 by becoming the first ship ever to sail under the ice cap at the North Pole. Two years later the nuclear submarine *Triton* sailed around the world in 84 days (just four days off of Jules Verne's pace) without surfacing once!

Ships of all types can now travel directly between the Great Lakes and the Atlantic Ocean, thanks to the opening of the St. Lawrence Seaway in 1959. Until then cargo had right from the start with world-wide contacts being made through it, erasing any doubts that amateur radio had an important role to play in space communications.

In 1969 I reviewed the success of the OSCAR program with a group of east coast space scientists and engineers near Washington, D.C. It was evident to me at the time that with the design and building of larger and larger satellites, and with world-wide participation, the OSCAR concept had to be enlarged. As a result of my comments at this meeting the AMSAT-OSCAR organization was formed, with the official name *Radio Amateur Satellite Corporation*. The first satellite launched for AMSAT was dubbed AO-5. It was designed and built by students at the University of Melbourne in Australia. It contained beacon transmitters on 2 and 10 meters. The rest is history. AMSAT-OSCAR to date has had ten communications satellites launched that were designed and built by its members. Affiliated AMSAT organizations in Russia, Japan, Germany, France, United Kingdom, South Korea and Italy have also designed, built and had launched several additional radio amateur satellites. The amateur radio satellite program has not only provided new ways for long-distance communication, it also clearly demonstrates the purpose of amateur radio: voluntary contributions of communication knowledge and time motivated only by personal satisfaction.

I am especially proud to have been a part of the radio amateur satellite program from its inception. It has touched my life in a very positive way, as I am sure that it has also touched the lives of the thousands of radio amateurs and others who have voluntarily participated in amateur radio space communications during the past 34 years. What better way to learn about space communications than by participating in it?



THE REVOLUTIONARY NEW
CENTRAL ELECTRONICS 100V
EXCITER-TRANSMITTER

BROADBANDED! ONLY
ONE TUNING CONTROL,
THE VFO ITSELF.

CENTRAL ELECTRONICS THE PIONEER OF AMATEUR SSB IS PROUD TO BRING YOU THE FINAL RESULT OF THREE YEARS OF THE KIND OF PATIENT ENGINEERING, TESTING AND IMPROVING THAT MAKES FOR A SUPERIOR PIECE OF ELECTRONIC GEAR.

MANY OF THE TRIED AND TRUE PRINCIPLES AND FEATURES OF THE ORIGINAL MULTIPHASE EXCITERS HAVE BEEN RETAINED IN THE NEW 100V, ALTHOUGH IN VASTLY IMPROVED FORM. THE USE OF PATENTED BROADBAND CIRCUITRY THROUGHOUT PRACTICALLY ELIMINATES "COCK-PIT" TROUBLE.

REGARDLESS OF YOUR PREFERRED MODE OF OPERATION, IT'S ALL IN THE 100V. SSB, DSB, AM, PM, CW and FSK . . . AND ALL AT THE FLIP OF ONE SWITCH. ALTHOUGH THE 100V WILL PROBABLY FIND IT'S GREATEST USE AS A SINGLE SIDEBAND SUPPRESSED CARRIER EXCITER-TRANSMITTER . . . NO ONE HAS BEEN "LEFT OUT IN THE COLD" IN IT'S DESIGN. THIS IS THE KIND OF A RIG THAT HAMS DREAM ABOUT!

CHECK AND COMPARE THESE FEATURES

Ham Radio History *cont.*

or two. But the die was cast when the manufacturers cast their lots with SSB. The Hallicrafters SX-101 receiver and HT-32 SSB transmitter proved to be popular equipment for the switchover to SSB for many AM holdouts. Drake introduced the 1A SSB receiver in 1957. SSB was "in," AM was "out"!

Meanwhile, in 1956 a "floating DXpedition" was attracting great attention. Danny Weil, VP2VB, on the good ship *Yasme* (which had more lives than a cat), started on a round-the-world trip that promised DXers a whole batch of new island-countries. Eventually, the Yasme Foundation grew out of Danny's early DXpeditions.

Amateur Radio Widens Its Horizon

By 1957–58, ham radio was in full post-war flower. The sunspot cycle peaked at an all-time high of 201. Worldwide DX was available to even a modest station on 50 MHz. DXCC and WAZ awards were flourishing. A Novice station achieved WAC on the new 21 MHz band! RTTY gained in popularity

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to be offloaded in Buffalo, then taken by barge to New York City. Traveling by car is getting easier, too. Work crews are busy around the country building new superhighways for long-distance travel. These "interstate" highways will eventually criss-cross the nation with high-speed, multi-lane, limited-access highways. So you won't get stuck behind a slow driver anymore, or have to worry about traffic lights in town after town along your route. Some of these highways even have their own restaurants and gas stations—"service areas" they're called—so you don't have to get off the road to fill up. These superhighways are coming just in time, too. As of five years ago there was one car on the road for every three people in the United States (as opposed to one for every 22 people in Europe). And 15% of American families owned more than one car. Airplane travel is changing, too. In 1958 Boeing rolled out its first jet passenger plane, the 707. Someday nearly all inter-city air travel may be on jets.

Among the places to which we're driving and flying is a giant amusement park called Disneyland, which opened in California in 1955. Kids love getting the chance to meet their favorite Disney characters in person, so to speak. And those of us who can't afford vacations in Disneyland are driving to drive-in movies. *Newsweek* magazine says the number of drive-in theaters doubled in the 1950s to some 5,000 in 1960, and I'm sure there are more today.

If movies aren't your speed, and you happen to be in New York City, you can visit the newly-opened Lincoln Center for the Performing Arts. It's now home to the New York Philharmonic, the Metropolitan Opera and the Julliard School of Music.

Music. Now *there's* something that's changed radically in the past ten years, with new stars, new styles and a whole new kind of music. Kids today have their ears plastered to their transistor radios, and rock 'n roll is king of the airwaves. The first big rock 'n roll hit was Bill Haley's "Rock Around the Clock" back in 1955. Then Chuck Berry came along with "Maybelline" and "Roll Over, Beethoven." I'm sure he's doing just that—especially if he's heard Elvis Presley or the Rolling Stones.

The single biggest music sensation of the decade, though, has to be a long-haired group from England called The Beatles. They already had several major hits to their credit when they came to the U.S. last year on tour. Wherever they went, they were mobbed by hysterical crowds made up mostly of teenage girls. It turned into a phenomenon called "Beatlemania." The British army couldn't conquer America, but these four British musicians did it with ease.

Rock 'n roll music has its roots in Negro gospel and

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Ham Radio History *cont.*

on the HF bands as some surplus Model 15 teleprinters hit the market. SSB equipment was readily available and simpler to operate. Some choice DX even started to show up on SSB.

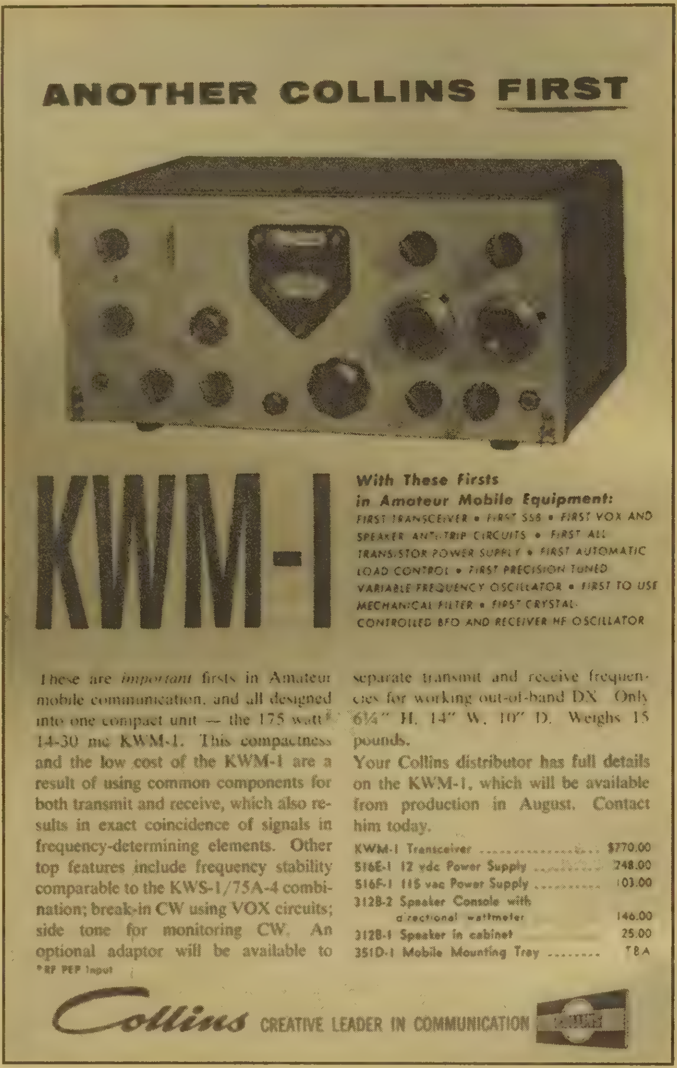
For the SSB operator, the introduction of the Collins KWM-1 transceiver in 1957 was a landmark change in equipment and also operating philosophy. The idea of combining receiving and transmitting functions in one box was a novel one, but would the concept last?

The *CQ* VHF column noted the appearance of several 96-element collinear arrays for 432 MHz ,and some VHFers were experimenting with transistorized converters for 6 meters. Results—not so good. The vacuum tube was still hanging in there! On the high frequencies, backscatter contacts on 10 meters were popular and exciting. Why had they not been generally noticed before? QSOs via meteor showers were logged in 1957; surely there were a lot of surprises above 50 MHz! On 144 MHz, KH6UK (Hawaii) and W6NLZ (California) reported a trans-Pacific QSO. They followed this feat in 1959 with a 220 MHz contact, which led to the theory of VHF ducting. Would it be possible to duplicate the feat on 432 MHz? Suddenly, anything was possible in the VHF region!

The fall months of 1957 brought about two interesting happenings. JT1AA showed up on the DX bands from Mongolia! This activated Zone 23 once again for the DXers who had sorely missed the Tibetan stations of a decade earlier. The second happening had a longer-lasting impact.

Sputnik: A Radio Beacon in Space!

October 1957 marked the advent of the space age with the USSR's launch of "Sputnik," the world's first artificial satellite. Beeping pulses on 20 and 40 MHz, it could be heard by anyone who had a good shortwave receiver. It made believers in the space age out of many skeptical hams and



ANOTHER COLLINS FIRST

With These Firsts in Amateur Mobile Equipment:

FIRST TRANSCEIVER • FIRST SSB • FIRST VOX AND SPEAKER ANTI-TRIP CIRCUITS • FIRST ALL TRANSISTOR POWER SUPPLY • FIRST AUTOMATIC LOAD CONTROL • FIRST PRECISION TUNED VARIABLE FREQUENCY OSCILLATOR • FIRST TO USE MECHANICAL FILTER • FIRST CRYSTAL-CONTROLLED BFO AND RECEIVER HF OSCILLATOR

These are *important* firsts in Amateur mobile communication, and all designed into one compact unit — the 175 watt* 14-30 mc KWM-1. This compactness and the low cost of the KWM-1 are a result of using common components for both transmit and receive, which also results in exact coincidence of signals in frequency-determining elements. Other top features include frequency stability comparable to the KWS-1/75A-4 combination; break-in CW using VOX circuits; side tone for monitoring CW. An optional adaptor will be available to separate transmit and receive frequencies for working out-of-band DX. Only 6¼" H, 14" W, 10" D. Weighs 15 pounds.

Your Collins distributor has full details on the KWM-1, which will be available from production in August. Contact him today.

KWM-1 Transceiver	$770.00
516E-1 12 vdc Power Supply	248.00
516F-1 115 vac Power Supply	103.00
312B-2 Speaker Console with directional wattmeter	146.00
312B-1 Speaker in cabinet	25.00
351D-1 Mobile Mounting Tray	TBA

*RF PEP Input

Collins CREATIVE LEADER IN COMMUNICATION

Joe's Journal *cont.*

rhythm & blues music. The emergence of Negro music in America's mainstream has been accompanied by great strides in civil rights among the Negro people. The Supreme Court, which had ordered an end to segregated schools in 1954, reinforced that ruling in 1955, declaring that all provisions of federal, state and local law must honor the principle of public education without racial discrimination.

Then in late 1955 in Birmingham, Alabama a colored woman named Rosa Parks was arrested after she refused to give up her bus seat to a white man. Her arrest touched off a year-long boycott of the city's buses and is generally credited with launching the civil rights movement. The boycott also brought to prominence a young Birmingham minister who preaches non-violent resistance, the Rev. Martin Luther King, Jr. Through the late '50s and early '60s Dr. King led a series of marches and "sit-ins" for racial equality. In 1963 he led 250,000 protesters in a march on Washington and delivered one of the most powerful speeches of all time.

"I have a dream," he told the crowd, "that one day this nation will rise up and live out the true meaning of its creed, 'We hold these truths to be self-evident, that all men are created equal.' "

King won the Nobel Peace Prize in 1964, and if this country ever elects a colored President, there's a good chance it'l be Martin Luther King.

The Civil Rights movement scored significant legal gains, with the passage of the Civil Rights Acts of 1957, 1960 an 1964, which outlawed most forms of racial discrimination, and the 24th amendment to the Constitution, which bars "poll taxes" historically used to prevent Negroes from voting But protests have often been met by violence, and federal troops had to go to Arkansas in 1957 to assure the desegregation of Little Rock High School. Change is coming, but not easily. And there's still a long way to go.

Change is coming much more quickly in our homes and offices. It's the rare office today that doesn't have electric typewriters, often IBM's "Selectric," with a stationary carriage and interchangeable type "balls" offering a variety of typefaces. Carbon paper is starting to become obsolete, too, with the introduction of ever-more-efficient photocopying machines. Soon typing errors will be obsolete, too. Just last year IBM introduced a typewriter that stores what you type on magnetic tape. If you make a change, it corrects the directly led to the formation of the OSCAR satellite project. A whole new mode of communication lay ahead for amateurs, most of whom did not realize the implications of this newsworthy event.

In this same time frame, the CDR "HAM-M" antenna rotor appeared on the ham market, along with "Skillman" telegraph keys. These keys were the first trickle of the flood of Japanese equipment that would eventually revolutionize and restructure the amateur radio market.

Also of interest to communicators was the introduction of the British Racal RA-17 HF receiver which eliminated birdies and images through the use of a 40 MHz IF strip. Not many hams bought this expensive receiver, but they did buy the new Central Electronics 100V and the Collins 32S-1 SSB transmitters, which appeared at about the same time.

DXers were amazed at the signal of W6KPC in 1958, as he finally got his rotary driven array of 16 elements on the air. It towered up over 100 feet and was "the big signal" on 10, 15 and 20 meters.

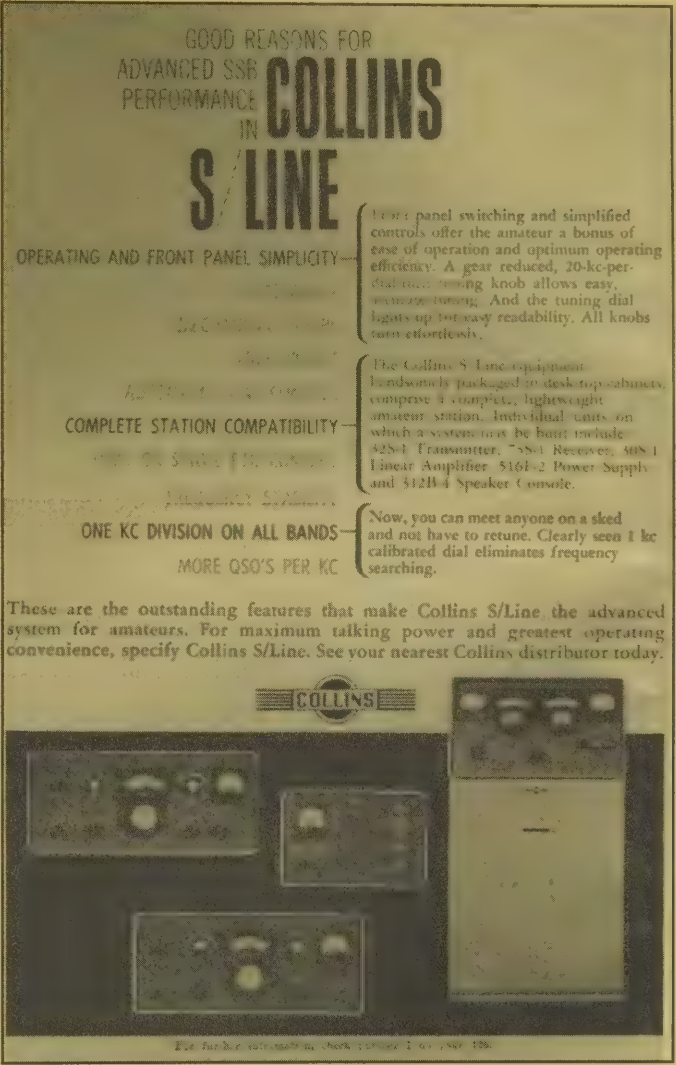
In late 1958 the 27 MHz band was withdrawn from the amateur service and turned over to CBers. Lack of use by amateurs was one reason cited by the FCC for this change. At about the same time, the FCC introduced the WA prefix, as the supply of single-letter prefixes was about to run out.

Six meter WAC was achieved in 1958 by W6BAZ, and the 1215 MHz DX record was stretched to 225 miles by W6MMU/6 and W6DQJ/6.

New Equipment—New Ideas

In January 1958 *CQ* featured an article about a 1215 MHz converter using a cascode pair of 417A tubes, with a crystal controlled mixer chain. Low noise reception for this band was at hand.

CQ also featured a kilowatt mobile transmitter built by W6EI, using a pair of Eimac 4W300B water-cooled tetrodes. Just the ticket for 20 meter DX! And to adjust the mobile


GOOD REASONS FOR ADVANCED SSB PERFORMANCE IN COLLINS S/LINE

OPERATING AND FRONT PANEL SIMPLICITY — Front panel switching and simplified controls offer the amateur a bonus of ease of operation and optimum operating efficiency. A gear reduced, 20-kc-per-dial-turn tuning knob allows easy, accurate tuning. And the tuning dial lights up for easy readability. All knobs turn effortlessly.

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COLLINS

tape. And when you're done, it automatically types a perfect document. They could've found a better name for it, though. How many people are going to trade in their typewriter for a "word processor"?

Television has taken root firmly in our homes, and a growing number of sets today can receive in color. There's also new technology for recording sounds and images. In 1956 a company called Ampex introduced videotape, which records on magnetic tape instead of film. It's reusable and doesn't have to be developed. And while its use has been limited so far, I'd guess that it has a great future. So does another new tape product, the "compact cassette" for audio recording, introduced by Philips in 1963. The cassette fits in the palm of your hand, yet it can record an hour or more of voice or music.

Other changes in our homes include non-stick frying pans coated with a substance called Teflon, which a duPont scientist discovered by accident in 1938; Pyrex ceramic cookware that can go from freezer to oven without cracking; home freezers and combination refrigerator-freezers; plastic bags; freeze-dried instant mashed potatos and electric carving knives. Some people even have electronic "microwave" ovens which cook without getting hot inside. We won't need to heat the iron as much either. Last year the stores started selling "permanent-press" clothes.

Back at the office and factory computers are finding uses in more and more businesses. Bell Labs built an experimental computer using transistors in 1956, the same year that the three Bell engineers who invented the transistor won the Nobel Prize for Physics. In 1959 RCA introduced its 501, the first fully-transistorized computer. But believe it or not, transistors are already on their way out! Also in 1959 something called the Integrated Circuit, or IC, was developed. These "chips" can pack the power of dozens of transistors and other components onto tiny silicon wafers that are sandwiched together in a single unit. IBM has already put ICs to work in its "third generation" of computers, which debuted last year with the model 360. The past decade has also seen the development of light-emitting diodes, laser beams and so-called "optical fibers," which can carry light beams like wires carry electricity. I'm not sure how these devices will be used in the future, but I'm certain we'll see more of them.

Another area of great progress in the past ten years has been in medicine. Jonas Salk's polio vaccine, developed in 1952 and first used on a mass scale in 1954, was declared a

DI-DI-DI-DIT, DI-DIT

By Donald L. Stoner, W6TNS

CQ has always taken great pride in its leadership in promoting innovations such as single sideband, mobile communications, RTTY and amateur space communications. Nowhere is this tradition of leadership more evident than in the story of how CQ *got Project OSCAR off the ground.*

Each of us at one time or another has said something, made a recommendation or taken an action that has had a profound effect on others. Some, like myself, know the inner thrill of affecting history with nothing more than a simple statement.

In the late 1950s I was the Semiconductor Editor of *CQ* magazine. The gigahertz-busting devices we employ in our SHF preamps today were just a gleam in the eyes of physicists back in the "good ole daze." In fact, when I started writing the *CQ* column, silicon and gallium had not been used in those tiny, metal miracles. Germanium was the element de jour, and getting a transistor to work at 144 MHz required an equal mix of skill and black magic incantations (as in "oscillate, dammit!").

As the decade came to an end, I had pushed up my various transmitter designs from 5 or 10 milliwatts to a rock-crushing 50 milliwatts (yes, all of 0.05 watts). On a nice summer weekend my bride and I piled into the family jalopy and headed for WA6EJI's home away from home in the San Bernardino mountains at Running Springs, California. Tony had offered to let me put the tone-modulated beacon and a 38 inch dipole antenna up on the roof of his cabin as an experiment.

Lo and behold, my germanium gargantuan was heard in San Diego, 120 miles south, and with an S9 signal strength! Now you don't have to be a propagation guru to realize that signals from 120 miles straight up should be as good as, or better than, signals from 120 miles over land!

And so it came pass that I published the circuit for the tiny transmitter in *CQ* magazine along with the cutesy comment "Does anyone have a spare rocket for orbiting purposes?" *And someone did!* No sooner had the magazine hit the mailboxes than I received a call from Fred Hicks, W6EJU, up in Sunnyvale, south of San Francisco. Fred was involved with the Lockheed Amateur Radio Club. He excitedly told me that Lockheed, which had an excellent working relationship with the Air Force, just might be able to inject a beacon into orbit.

Talk about skeptical city. Lockheed made and orbited top-secret goodies for the government. Share a ride with something that didn't officially exist? No way, I thought. But thanks to the influence and perseverance of those too numerous to mention, it did happen. And, as they say, the rest is history.

The moral of the story, guys, is *Watch what you say. Someone just might take you seriously.*

Ham Radio History *cont.*

antenna, or other antennas, W2AEF designed and described in *CQ* the "Antennascope," the forerunner of a whole series of inexpensive antenna measuring instruments.

The handwriting was on the wall: the June 1958 issue of the IRE *Proceedings* was devoted entirely to "The Decade of the Transistor"—surely a harbinger of things to come!

In early 1959 RCA, bucking the trend, introduced the Nuvistor for ham use. This tiny tube was designed for the front-end of TV receivers, but it quickly became popular in ham circles for VHF converters and receivers. It was a hot

Joe's Journal *cont.*

success in 1955. Two years later Albert Sabin introduced an oral polio vaccine that today has all but replaced Salk's injected vaccine. We also have a vaccine against measles now, and the dream of replaceable body parts is starting to become a reality. Successful liver and lung transplants were first performed in 1963, and an artificial heart was used during surgery for the first time. One of the first practical uses for lasers has been in eye surgery, performed for the first time in 1962. And in 1958 a doctor in Scotland figured out a way to use very high frequency sound waves ("ultrasound") to create an image of an unborn baby.

Not even sports has escaped the rapid pace of change in the past decade, nor the growing tendency of Americans to pack up and move from one end of the country to the other. In baseball, for example, the Philadelphia Athletics moved to Kansas City in 1955, followed by the exodus of two New York teams in 1958—the Giants moved to San Francisco and the Dodgers left Brooklyn for Los Angeles. In 1961 Washington, DC's baseball team moved to Minneapolis-St. Paul and became the Minnesota Twins, making room for a new Washington Senators team, added along with the Los Angeles Angels, as the American League expanded to ten teams. The National League followed suit in '62, adding the Houston Colt 45s, playing on artificial grass (called "astroturf") in a domed stadium, and the hapless New York Mets, perhaps the worst Major League team ever to take the field.

It's been a great decade for personal achievements in baseball. 1956 was a banner year for the New York Yankees as Mickey Mantle captured baseball's triple crown, leading his league in batting average, home runs and runs batted in, and Don Larsen made history by pitching a perfect game against the Dodgers in the World Series. Also in 1956 Jackie Robinson, the first Negro Major Leaguer, retired from baseball. He became the first colored member of the Hall of Fame in 1962. Ted Williams, the last man to bat .400 in a season (1941), retired in 1960, but not before winning his sixth American League batting title in 1958—at age 40! Finally, in 1961 Roger Maris hit 61 home runs, breaking Babe Ruth's 1927 record.

Wilt Chamberlain has brought new excitement to professional basketball. He's won the NBA scoring championship for the past five years and is heading for number six. In 1962 he became the first NBA player to score 100 points in a single game.

little tube, much cheaper than the 417A, and it served well during its short existence. But the transistor would soon overtake it.

In the fall, Lafayette Radio advertised the HE-10 receiver, signaling the introduction of Japanese communication equipment into the US market. The HE-10 was a knock-off of the Hallicrafters S-40, and a poor one at that. But it was a tip-off of things to come!

On the DX front, 3A2AF (W6SAI) spurred SSB popularity using a Hallicrafters HT-32 and SX-101. If you wished to work Monaco, you had to be on SSB! Other DX stations that enlivened 20 meters were AC5PN (Bhutan) and VQ9ERR (Seychelles).

In 1960, *QST* magazine ran a survey of its readers to determine operating habits. The division between AM and SSB operation fell at about 50-50, with the exception that 75-percent of voice operation on 20 meters was SSB. The old order was changing rapidly!

DXers and rag-chewers were astounded and bemused by the description in *CQ* of the 40 meter, full-size, 3-element Yagi of W3KRQ. Other, less-exuberant, hams popularized the 7 MHz ground plane antenna, once the antenna of choice of many VHF operators.

Transistors Advance

Transistors finally were being designed into ham equipment by 1960. It was a modest beginning, encompassing converters, keyers, audio amplifiers and low-power HF rigs. In the fall, *CQ* described a 2 meter converter using Philco T-1600 VHF transistors. The Heath Company brought out the little GW-30, a 10 meter transistorized hand-held transceiver, the mediocre performance of which didn't enhance the average ham's view of solid-state equipment.

On the up-side, Bill Leonard, W2SKE, presided over a ham radio program on the Voice of America that was popular in the USA as well as abroad. (Bill's writer was none other than *CQ* Editor Gene Black, W2ESD.) And VHF enthusiasts received a jolt when W6HB (Eimac Radio Club) worked W1FZJ (Rhodendrum Swamp Radio Society) via moonbounce on 1296 MHz! Both stations used 1 kW surplus klystrons and dish antennas—not typical ham gear. But the experiment proved that moonbounce QSOs were well within the capability of amateur radio!

Some new and interesting ham gear came on the market in the 1957–59 period. Heath Co. brought out the HW-30, otherwise known as the "Hotwater 30" 2 meter transceiver. The kit cost $45. Another Heathkit was the HA-10 linear amplifier, with four 811As. And Lafayette Radio announced the "Voyager," a 120 watt CW transmitter (made in Japan).

W6QKI developed a nifty 80 meter SSB transceiver and started selling them to his friends and local radio stores. This was the beginning of Swan Engineering Company, soon to become one of the world's largest manufacturers of ham transceivers.

By May 1957 over 1500 WAZ certificates had been issued and the DX world was excited with the HK0TU (Malpelo Is.) DXpedition and the appearance of CR10AA in Timor. Also on 20 meter SSB was W8OLJ/MM, *S.S. Hope,* the floating medical center bound for Indonesia and Vietnam. A DXpedition to Haiti described that country as the beautiful "Switzerland of the Caribbean." Maybe so then, but not today.

Ham Radio is Diluted by CB and SSB!

As the 1960s began, astute observers noted that there seemed to be a slackening in the pace of ham radio. Lots of new equipment was on the market to entice the buyer's pocketbook, but there were signs of price-cutting and discounting among some of the ham distributors, something that had not happened for a long time. Was ham radio growing stale?

Almost unrecognized were the effects that CB and SSB were having on amateur radio. CB siphoned off many would-be hams. Why get a ham ticket when you could go on CB and work DX just like hams do? The 11 meter region was full of juicy DX contacts, and old ham gear, like the Viking Ranger, was ready to go on 11 meters with no modifications!

At the same time, ham radio was disappearing from the receivers of another group of would-be hams: shortwave listeners. Avid youngsters who had home-built, two-tube receivers, or inexpensive shortwave sets (like the S-38), found

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Boxing has a new star, too. Last year a loudmouth named Cassius Clay knocked out Sonny Liston to win the heavyweight title. He hasn't had to defend it yet.

But the National Football League has to defend itself from competition. The American Football League was formed in 1960 and is starting to give the NFL a run for its money.

What's ahead for the next 10 years? I think there's a good chance we'll reach the moon, and an equally good chance that we'll all blow ourselves to bits in a nuclear war. Vietnam will continue to occupy our armed forces for at least a few years; the Middle East and the Russians will continue to be thorns in our sides.

I think technology will continue to help us take giant steps in medicine, and computers will become a major part of our offices and factories. But I think the predictions I've seen of automatic highways, electronic shopping and post offices sending mail instantly from coast to coast with facsimile machines is still more within the realm of science fiction than science fact. But then again, I don't think I could have predicted the past decade accurately back in 1955. It'll be fun to look back in another ten years to see how backward we humans were in that ancient time of 1965.

(Researched & Written by Richard S. Moseson, NW2L)

Always A Gentleman, Always Seeking Perfection Bill Scherer, W2AEF

By Dick Ross, K2MGA, Publisher, *CQ*

Bill Scherer, W2AEF, was *CQ*'s Technical Director and in-house equipment reviewer through the 1960s and early '70s. Bill was the most accomplished electronics technician I've ever had the pleasure to meet. As a builder and experimenter myself, it was an extraordinary honor to work with a person of Bill's caliber.

He did all of our equipment reviews for about 15 years, but never once took the equipment review process lightly. Bill had a rare sense of honor and responsibility to the reader. Knowing that hams might be spending a great deal of money based on his review, he felt honor-bound to give as thorough an analysis of each rig as was humanly possible. But also realizing that the manufacturers had invariably invested huge sums to develop new equipment and still might miss the mark, he would sometimes re-engineer—free—whole sections of a rig that fell short of the needs of the ham. Few hams ever knew that the performance of much of the gear they purchased in the '60s and '70s often owed a debt to Bill's quest for technical perfection.

As an inventor and innovator, Bill was very special. I've always admired those rare people who could create whole systems or devices where nothing existed before—not building upon the work of others, but laying foundations for others to build on. That was Bill. When he first became interested in OSCAR, he realized that there was a need for a simple, graphic way to anticipate the appearance of a satellite anywhere in the world. Sure, with some math and some good starting parameters you could do the job. But in those pre-PC days, it was a tedious task. Bill conjured up something he called the "Oscalator," a simple home-brew plotting tool made out of shirt cardboard and celluloid that took all the pain out of working those early "birds." The satellite plotting gadget sold by the ARRL for many years now is basically Bill's old Oscalator.

Bill Scherer, W2AEF, in the CQ *lab, c. 1964.*

Bill had the curiosity and the tenacity to stick with any problem until he had solved it. It didn't even matter what the field was. Unsatisfied with the average-quality photographs that ran with his articles, he taught himself studio photography and professional darkroom techniques. Then he taught our readers what he had learned. His equipment photos were works of art.

Always the gentleman, always seeking perfection, always ready to help. I treasure my years with Bill.

Ham Radio History *cont.*

that due to receiver limitations radio hams were "invisible"—that is, they could not copy the ham signals. But the AM signals of CBers were loud and strong! As a result of these influences, the growth pattern of amateur radio slowly deteriorated. It was not generally appreciated, but it became more apparent as the years passed.

Technical Developments in Ham Radio

In 1957, VHFers took notice of a 220 MHz converter described in *CQ*. It used inexpensive ($4.65) Philco 2N502A transistors. About the same time, W2BXK worked 500 feet on 52 GHz using a klystron and dish antenna at each end of the circuit.

By April, the famous Collins 30L-1 Linear amplifier was on the market, and EIMAC announced the 3-400Z, the forerunner of a series of high-power triodes designed expressly for SSB service. Later in the year, that indispensable aid to construction, heat-shrink tubing, came on the market!

Two other items of note happened that year. The Goldwater reciprocal licensing bill (S.2361) was proposed by the Senator (K7UGA), and Hy-Gain Co. announced the first log-periodic dipole antenna for amateur radio service. It covered 13–30 MHz.

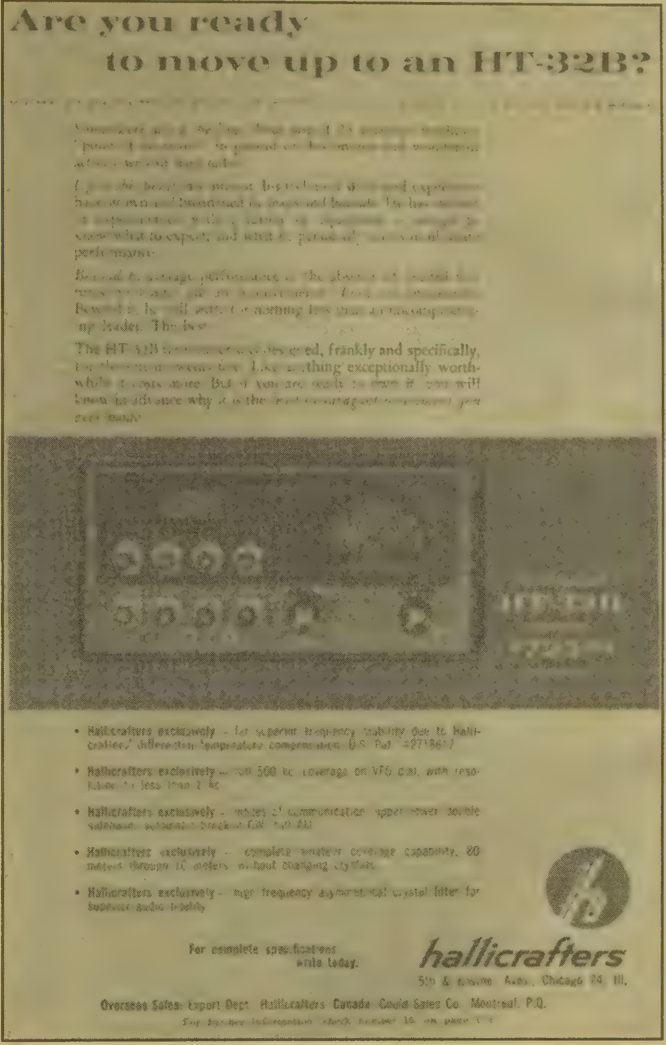
OSCAR I: The World's First Ham Radio Satellite

In December 1961 an event occurred that made a deep impact on amateur radio and its place in the world of communication. The first amateur satellite, OSCAR I, a 2 meter beacon, was launched successfully! It was the first non-governmental satellite ever placed in orbit.

The road to that launch started almost immediately after Sputnik's launch in 1957. Hams in the aerospace world began thinking about launching an amateur communication satellite. Thoughts were turned into action in 1959 after *CQ* semiconductor columnist Don Stoner, W6TNS, wrote about a transistorized, 50 milliwatt, 2 meter transmitter that he'd designed.

"Does anyone have a spare rocket for orbiting purposes?" he asked. That column led directly to the formation of Project OSCAR by hams in the San Francisco Bay area. Their goal was to launch ham radio into space. (*See Don Stoner's rec-*

> **"Being an author in *CQ* was a passport to a new world of acceptance as an authority on various matters. The doors this opened cannot be valued in dollars and cents, but certainly contributed to my current and comfortable life."—*Don Stoner, W6TNS***



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ollections, "Di-di-di-dit, di-dit," elsewhere in this issue; as well as reminiscences by George Jacobs, W3ASK. Both George and Bill Orr were part of the original Project OSCAR team.—ed.)

The launching process was a painful and complex task. It required the know-how to build the satellite; the approval of the ARRL in order to gain political clout; the okay from the FCC (which was bemused by the idea of an unattended US amateur transmitter circling the globe); and finally, the agreement of the US Air Force to launch the satellite on a regularly-scheduled space mission. All of this took time and the devotion of many hams, both in and out of government.

The OSCAR launch was from an air base in California and an agonizing period elapsed until hams at KC4USB in Antarctica heard the satellite on its first pass around the globe! Reception reports poured in from many countries and the attendant publicity of the experiment encouraged Project OSCAR (and others) to start thinking about a translator (linear repeater) that would permit two-way VHF communication over great distances.

OSCAR I was the forerunner of a spectacular series of ham satellites, growing in complexity and sophistication over the years, as hams worldwide joined AMSAT (the Radio Amateur Satellite Corporation), the offspring of Project OSCAR.

Even though relatively few amateurs took part in the early satellite experiments, their long-term results were profound. The Amateur Satellite Service was recognized internationally, giving stature to amateur radio as a whole. Gradually other nations, led by the Soviet Union, built and launched amateur satellites, leading eventually to live amateur radio in space, with the advent of the continuing series of manned space station launches.

Towards the close of 1961 *CQ* announced the "Worked All US Counties" award. Here was something new to keep the award hunters happy!

1962: Gus Goes on a DXpedition!

In early 1962, Gus Browning, W4BPD, drew up plans for his long-awaited around-the-world DXpedition. One of his first stops proved to be VQ9A in the Seychelles Is. And there was more to come as this dare-devil DXer wound his way through Africa and Asia.

A few lucky hams worked the first post-war station in mainland China: BY1PK appeared for a few QSOs, mainly with Soviet Bloc countries. A lot more lucky hams took part in the first annual 160 meter contest, sponsored by *CQ*. And 80 meter SSB DX was growing by leaps and bounds, centered around 3.8 MHz. Another compelling argument to switch to SSB.

Interest in RTTY was sufficiently high to bring back *CQ's* column on that subject (Wayne Green, W2NSD, wrote *CQ's* first RTTY column, starting in 1951), and the December *QST* announced that the DXCC count had zoomed to 8,755. It would seem that interest in ham radio was quickening again, after the apparent slump a few years earlier.

In spring 1962 W1BU heard KH6UK (Hawaii) on 1296 MHz moonbounce, and a two-way QSO was held between these two stations in August. Meanwhile, on the 2 meter band, K1HMU and W1ZIG completed their 480-element rotatable array to be used for possible moonbounce activity on that band.

A lot of new gear was coming on the market. E.F. Johnson Co. ran full-color ads featuring nine ham transmitters or kits, ranging from 40 watts to 2 kW PEP capability. In 1963, Drake announced the TR-3 transceiver and Heath Co. brought out the SB-300 receiver kit.

The Licensing Problem

During the early 60s, both the Department of State and the FCC took note of a gradual change in the makeup of the International Telecommunications Union, of which the US was a member. A shift in political power had occurred, with the so-called "developing countries" gaining prominence (and votes). Most of these countries took a dim view of ham radio and coveted our frequencies. Some tropical countries wanted large hunks of 80 meters for tropical broadcasting, others wanted 40 meters for the same purpose. The top end of 20 meters was eyed by the fixed services.

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It had been rumored that an African Embassy in New York City had made a recording of a drunken party on 80 meters and proposed to play it at the ITU Conference, as an example of how American hams wasted their frequency assignments. The FCC also noted an increase in broad signals, splatter, foul language and bad manners on 20 meters. Perhaps opening the HF phone bands to General Class licensees, which had been undertaken a decade earlier, was not such a good idea.

At the 1962 ARRL National Convention, a spokesman for the FCC addressed the gathering and asked the rhetorical question "What has ham radio done for the public interest lately? What guarantee do we have that in the future the public interest will be served by your continued operation?"

The speech sent a chill through amateur radio. It was a clear message to "clean up the bands," with the implication that the prestige and respect of amateur radio in the United States (which held the large majority of the world's amateurs) was low and that the ham bands might be fair prey at the next ITU meeting.

It looked as if the experiment in General Class phone operation on all bands had proved unsatisfactory. Yet it seemed impossible to return to the days when 20 and 80 meter phone was restricted to the "Class A" licensee.

This dilemma was faced in the February 1963 *QST* editorial, which made a tentative proposal entitled "Restricted Voice Bands." This quickly became known as "Incentive Licensing" and created a firestorm of controversy. *QST* and *CQ* were flooded with letters pro and con the subject. Hotheads, blow-hards and rumor mongers got into the act and the whole subject was engulfed in a wave of emotion.

In the main, *CQ* agreed with an incentive licensing proposal, but differed with the ARRL in the execution.

Irv Tepper, ex-WB2FUZ, CQ Technical Editor, c. 1963.

A *CQ* editorial proposed that relicensing of all amateurs was not necessary, and that perhaps voice space for Extra Class hams could be taken from the CW bands. (This idea died a quick death.) *CQ* pointed out the "Ugly American" image, as viewed by many emerging countries which desired to convert useless ham bands into revenue-producing commercial and broadcast frequencies. But the *CQ* proposal of dividing the voice bands between the license grades was a serious one that many cooler heads viewed with interest.

Some thought the ARRL was a stalking horse for the FCC and that the licensing proposal should have taken place in the form of a FCC notice of proposed rule making.

That concept had back-fired a decade earlier. Never mind. The fat was in the fire.

A tentative proposal was placed before the FCC by the ARRL in November 1963. Phone privileges in the major HF ham bands would be restricted to Extra and Advanced Class operators, band-by-band, over a four year period.

No action was expected on this controversial change in amateur rules until at least 1964. The FCC, *CQ* and the ARRL expected to get plenty of feedback on this new proposal. They were not disappointed!

A blizzard of comments inundated the FCC, which decided to take its time on dealing with this very controversial subject. They would let the matter cool a bit.

Amateur Radio Stamps and K2US at the World's Fair

In 1964, an amateur radio stamp was issued by the US Post Office in connection with the 50th anniversary of the ARRL. And the FCC turned down a request from an amateur for permission to play "The Star Spangled Banner" twice a day on the ham bands. Also, in May of that year, the FCC raised the power limit on the 420 MHz band to one kilowatt in most of the country. But the burning question on Incentive Licensing had not yet been answered.

Also during this period, K2US was on the air from the New York World's Fair and some operators were playing with slow-scan TV, a novelty on the amateur bands. RCA announced the new 2N2857 transistor, rated up to 1000 MHz as a low noise amplifier. Now it would be possible to convert VHF receivers to solid-state! Fairchild Semiconductor announced the MA-4990 which would provide 4 watts at 50 MHz—at $60 per unit. Not many ham takers on this device.

A second amateur radio stamp (5 cents) was issued by the Post Office in December. In the same month some hams noted that Lafayette Radio was advertising an HA-350 hamband, dual conversion receiver for under $200 (once again, made in Japan).

Interesting, but was Japanese equipment reliable? The HA-350 was not a big seller and soon disappeared.

Obviously, the Japanese could not compete in the market for ham gear.

Au + H_2O = 1964

A radio ham in the White House? How about a 3-element beam on the roof, or a 60 foot tower in the Rose Garden? It could happen! Many amateurs were overjoyed when K7UGA (Barry Goldwater) was nominated by the Republicans as their Presidential candidate in 1964.

What a great event for hams to have one of their own in

Here's the low cost, high quality set-up you need to begin your new hobby of Amateur Radio . . .

HR-10 RECEIVER

• Covers 80 through 10 meters • Tunes SSB, AM & CW signals • Prebuilt, prealigned tuning assembly • RF stage for extra sensitivity • Lattice-type crystal filter for high selectivity

An ideal novice receiver! Easy to build with preassembled, aligned tuning unit, and precut, cabled wiring harness! Versatile controls. Large slide-rule dial, built-in S-meter for [illegible] tuning, built-in BFO for SSB & CW reception and a host of other high performance features to delight any amateur radio fan! Features amateur band coverage only for maximum accuracy and stability. Provision for plug-in 100 kc crystal calibrator. [illegible] superheterodyne circuit. A perfect style & performance mate to the DX-60 Phone & CW Transmitter!

Kit HR-10 20 lbs $8 mo **$79.95**
Kit HRA-10-1, Plug-in 100 kc crystal calibrator 1 lb **$8.95**

HG-10 VFO

• 80 through 2 meters coverage • Plugs into DX-60 for general class operation • A tremendous savings over crystals for similar coverage

This high quality Heathkit VFO requires only plug-in connection to the DX-60 Transmitter to tune any frequency, any band for complete amateur coverage. Heathkit's designed through-out for years of top-notch performance & high stability. 12 lbs.
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• 90-watts phone or CW on 80 through 10 meters • Neutralized 6146 final amplifier • Built-in low pass filter • Operates at reduced power for novice operation

An exceptionally fine transmitter for the novice! Provides CW operation at the novice power limit and AM operation later as a general class license holder. Clean, rugged construction, high quality components, and easy to follow instructions make assembly an easy, fun-filled task. Controlled-carrier modulator and power supply are built-in. Single-knob bandswitching and Pi-network (coaxial) output provide for complete operating convenience. Panel meter monitors final grid or plate current for easy tuning. Less crystals.

Kit DX-60 24 lbs.
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WANT CW ONLY? . . . USE THE HX-11

Specially designed for CW work! Efficient circuit provides [illegible] plate power input for outstanding amateur communications. Covers 80 through 10 meters. Features built-in low pass filter, neutralized final amplifier, switched antenna relay power, pi-network output coupling and panel meter. Husky built-in power supply. Single knob bandswitching.
Kit HX-11 . . . 18 lbs. . . . $5 mo. **$43.50**

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"It wasn't the best of times. But I enjoyed doing it. It was a lot of fun."—*Arne Trossman, W2DTJ, on being Editor of* CQ

the White House! There was plenty of politics discussed on the air, something that had not happened before. At the nominating Convention in San Francisco, K7UGA was on the air in his spare time. There were monstrous pileups to work the future President. On November 4th, the voters decided otherwise.

An astute reader of *CQ* or *QST* in 1964 would note that the shift to SSB was accelerating: Heath, Johnson, Galaxy, SBE, Swan, Hallicrafters, National, Hammarlund, Collins, Gonset and Henry; along with many smaller manufacturers had SSB rigs on the market. And ferrite and powder-iron cores first became generally available to the home constructor. The FCC would note the explosion of illegal activity in the 11 meter band (CB). Lack of funds prevented any serious operation to be mounted against the pirate operators. No one mentioned the fact that some hams slipped down to 11 meters to join in the fun.

On the down side, city zoning laws were encroaching upon amateurs' right to have a large antenna tower.

Chicago went so far as to prohibit ham antennas and a nasty antenna fight erupted in Santa Barbara, CA. DXers were entranced by W4BPD, who continued his DXpedition around the world, ending up visiting over 40 rare countries, and piling up better than 150,000 DX QSOs!

VHFers, on the other hand, were excited about the appearance of KP4BPZ on 432 MHz, who was using the 1000 foot dish at Arecibo, Puerto Rico. And, some VHFers were using an auto-scan technique to check for band openings—the forerunner of the modern VHF scanner!

Finally, it should be noted that in April 1964 W6DNG and OH1NL made a two-way 144 MHz contact via moonbounce. A worthy record after innumerable attempts!

Public Service

Public service and emergency communications continued to be a major part of ham radio in the decade from 1955 to 1964.

Hurricane Diane in 1955 devastated the eastern seaboard and emphasized the need for more mobile power units, better short-distance VHF links and improved communication with the fire and police emergency networks.

The California forest fires of 1957 caused extensive damage, closing roads and disrupting normal communications. Teams of radio amateurs established back-up VHF links to augment the overwhelmed emergency communication circuits of the state.

The 1959 Yellowstone Park earthquake and Hurricane Carla (Texas) brought out many emergency teams of radio hams, whose effectiveness was enhanced by preparedness drills conducted in cooperation with the Red Cross and the ARRL National Traffic System and Emergency Corps.

The 1964 Alaska earthquake required teams of hams to establish emergency communication circuits before the municipal emergency circuits were activated.

For better or worse, hams responded to emergency situations through the formative years of post-war amateur radio. The 1965 amateur had better equipment, more experience in emergency service and was better trained than his 1946 counterpart. As amateur radio grew and expanded, so did the ham's ability to live up to the doctrine of "Public Interest, Convenience or Necessity," upon which the existence of amateur radio was based.

The First Two Decades Draw to a Close

Amateur radio had come a long way since the exuberant days following the end of World War II. It seemed well-accepted in the international forum, it had new and exciting VHF bands, plus a 15 meter band. The transformation to SSB had been accomplished and TVI, in the main, was no longer a threatening factor. *CQ* had been established as a respected voice in amateur affairs. The transition to solid-state equipment was underway. American manufacturers of ham gear seemed to be taking the small influx of imported equipment in stride. Very few anticipated the next momentous changes in communication, the ascendance of the Japanese equipment manufacturers and the introduction of the phase-locked loop in the matter of frequency control.

These developments, as well as the FCC decision on "incentive licensing," were to fall in the far future. Meanwhile, amateur radio was riding high! ■

1965–1974: Transistors, FM and Vietnam

By the time this decade ended, vacuum tubes were history, repeaters were quickly becoming a major part of ham radio and our country had undergone a major political and social change. It was the decade of Vietnam, race riots and Watergate. But as Bill Orr points out, in the ham radio world it was a happy and stable decade. The battles over SSB and incentive licensing had subsided, and the changes brought about by personal computers were still off in the future. It was also a tranquil time for *CQ*, as for the first time a single editor (K2MGA) presided over the entire decade.

Ham Radio History

1965–1974: Happy Days!

By Bill Orr, W6SAI

The sunspot cycle had reached bottom in the winter of 1964–65. Ten meters was dead and 15 meters was not much better. The burden of amateur radio communication fell on the lower frequency bands, which had largely been ignored during the binge of DX on the higher bands. In 1965 W6GTI worked JA6AK on 160 meters and helped to renew interest in the "Top Band." W1HKK dazzled the 80 meter DXers with his switchable vertical phased array.

There was still some life on the "DX Bands," though, as DXers chased CE0XA on San Felix island. Sideband DXers were impressed by the new Drake TR-4 transceiver, which provided first-class SSB/CW operation at a modest price!

In early 1966 FL8AK/K1QHP showed up in French Somaliland. ZL2AWJ was lost in a typhoon on an ill-fated DXpedition to Wallis Island. And the only legal amateur in Vietnam was active (K1YPE/XV5, the U.S. Ambassador). The Vietnam war brought about an expansion in MARS circuits to that country, and ads appeared in both *CQ* and *QST* offering to purchase selected surplus military communication gear, now needed by the Armed Forces.

By 1967 WWV had moved from Maryland to Colorado, and reception of the new station was acknowledged by a snazzy QSL card. At the low end of the spectrum there was increased interest in the 1750 meter band (160–190 kHz), even though it is not and never was a ham band. WA4GHK reported a DX record of 200 miles using a 100 milliwatt transmitter! And higher in frequency, W0NWX achieved a 160 meter WAC award! Clearly, there was life at the bottom of the sunspot cycle!

DX QSOs via Satellite!

Sunspots have little effect on VHF communications. OSCAR III was launched in March 1965. This satellite was a VHF translator which permitted two-way QSOs on the 2 meter band. Any two hams who could "see" the satellite could QSO through it. The first QSO was between HB9RG and DL6EZA. Soon a trans-Atlantic QSO followed! The success of this satellite prompted formation of new satellite clubs and groups on the east coast, as well as in Europe. Would WAS and DXCC be possible via satellite?

The next step came in December 1965 with the launch of

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Joe's Journal

January 1975

Well, we haven't blow ourselves up—yet. And we did send a man to the moon. Beyond that, when I looked forward from 1965 to 1975 a decade ago, I couldn't have begun to imagine what was about to unfold on the stage of history. Our moon landings were the major triumphs of the decade. Other than that, we lost a war, lost leaders to assassins' bullets, lost a President and a Vice-President to scandal and, more than anything else, we lost our collective innocence as a nation.

It was the decade of Vietnam, of protests, of race riots, of assassinations and hijackings, the decade of Watergate. It was also the decade of environmental awakening, women's liberation, hippies, flower children, Woodstock and "All in the Family" on TV. It's been a decade like no other.

Let's start with the high points. The highest, without question, came on July 20, 1969, when we all watched and listened as Neil Armstrong's voice announced from 239,000 miles away, "Houston, Tranquility Base here. The Eagle has landed." Hours later we were still glued to the live pictures on our TV screens as Armstrong climbed down a ladder and left the first human footprint on the moon. "That's one small step for a man," he told the world, "a giant leap for mankind." Indeed it was. Armstrong and his shipmate, Buzz Aldrin, were followed to the moon by five more teams of astronauts, each one staying a little longer and doing a little more. The last moon landing was in 1972. No more are planned.

It can really blow your mind, as the hippies liked to say, to think that just a decade ago we were marveling at the first live TV transmissions from one side of the ocean to the other. And less than ten years later the whole world watched live pictures from the moon.

Other space highlights of the decade include the Skylab space station, the first close-up pictures of Mercury sent back by the unmanned Mariner 10, and the 1971 launch of Pioneer 10, another unmanned craft, on a mission to Mars, Jupiter and the far edges of the solar system. Traveling at over 32,000 miles per hour—faster than any other man-made craft—it passed the moon just 11 hours after launch. Two years later it reached Jupiter and sent back new data on its moons and magnetic field. Pioneer 11, launched in 1973, is on its way to Saturn.

CQ *Publisher Dick Ross, K2MGA (minus beard and 25 years), as Editor, c. 1971.*

CQ *Editor Alan Dorhoffer, K2EEK (minus beard and 30 years), then Associate Editor, c. 1965.*

Another planetary mission was Mariner 9, which reached Mars in 1971 and became the first manmade craft to orbit another planet. Neither it nor two Soviet probes which arrived later in the year turned up any signs of little green men on the red planet.

We gained some insight into the origins of the universe during the decade that just passed—by accident. In 1965 two radio astronomers at Bell Laboratories, Robert Wilson and Arno Penzias, were trying to get rid of some pesky noise in their super-sensitive receiver. No matter where they pointed their antenna, even at the "quietest" spots in the sky, the noise was still there. Finally, they realized they had tuned in creation—the cosmic "background radiation" predicted by the "Big Bang" theory of how the universe began.

On a slightly more recent note, scientists last year discovered the skeleton of "Lucy," an early hominid estimated to be more than three million years old. That even predates "I Love Lucy" reruns!

Advancements in medicine have continued as well. A vaccine for rubella (German measles) was introduced in 1966; 1967 saw the first coronary bypass surgery and the first successful human heart transplant, the introduction of mammography to detect breast cancer, and the results of a 20-

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CQ's "Guiding Lights"

***CQ* Editor, 1965–1974**

Dick Ross, K2MGA: July 1964 – Mar. 1976

The first thing Dick Ross did as *CQ*'s ninth editor in less than 20 years was to have the revolving door removed from his office. Dick was editor through all of *CQ*'s third decade and into its fourth, bringing the magazine and its staff unprecedented stability. Looking back, he marvels most at the advancements in technology during that time.

"VHF and UHF have become so 'routineized' that things people do today with HTs that they don't even think about were cutting-edge stuff in the '60s," recalls Ross. "Even the advent of the transceiver was amazing stuff—having a transmitter and a receiver in a single box—and the transistor, of course."

"One of the cute things to come out of *CQ* and other magazines," Ross adds, "was the crossover from pure imagination in the April Fools articles to fact—for example, stealth technology, the amplifying diode, active noise absorption. These all were subjects of humor articles in the early '60s in *CQ* and other magazines. They all are now reality. We have stealth fighters, tunnel diodes, and feedback-cancelling mics." (See "A Secret Revealed," by W3ASK, in this section.)

The story of how Dick Ross joined the *CQ* staff is one of those classic amateur radio stories that most active hams experience at least once and love to retell. We'll retell it here in the form of a "conversation" with Dick and former *CQ* Publisher Richard Cowan, WA2LRO, derived from separate interviews with each of them.

K2MGA: I was 20 years old and a dropout from NYU's College of Engineering (they asked me to leave). I was a very active and very ardent 6 meter buff—AM, of course, as this was 1960. One day I was on the air and I heard this terrible, terrible signal on the band. It took a while to locate the source. It was coming from Great Neck, a couple of towns away. I called the guy and told him he had some pretty bad problems and ought to go off the air until he fixed them.

WA2LRO: I had just gotten my license and I got on the air with a Hallicrafters transceiver. I had just barely learned enough to pass the license exam and had no idea what I was doing. But I was on the air, and all of a sudden this booming voice says, "Get that thing off; you're splattering all over the band!" I said, "If you know so much, come over here and help me make it work." He asked me where I lived and I told him.

K2MGA: So I hopped in my father's 1955 Plymouth and drove to the rich end of town.

WA2LRO: About an hour later there was a knock on my door. There was this 6 foot string bean. He was about 20, but looked like 14.

K2MGA: I knocked on the door, and this pudgy guy with a big cigar introduced himself as Dick Cowan. I went downstairs and immediately saw the problem: he didn't know how to solder.

WA2LRO: He fixed my radio and showed me how to work it the right way. We started talking, and Dick explained that he had dropped out of school after flunking history. He said he wanted to be an engineer, but couldn't pass history and couldn't finish school if he didn't pass history. I asked him what his plans were. He said, "Oh, I don't know. I guess I'll go back to school and try again."

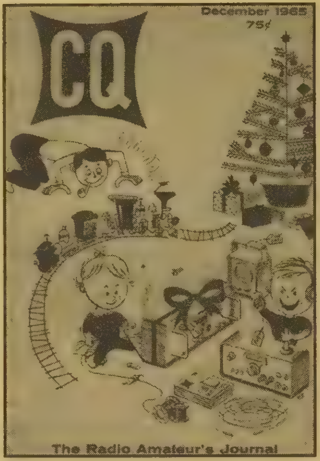
K2MGA: Then he said to me, "You know, my dad is publisher of CQ*." I said, "You know, that's a pretty lousy magazine." He said, "We're looking for an assistant editor. Would you like to interview for the job?"*

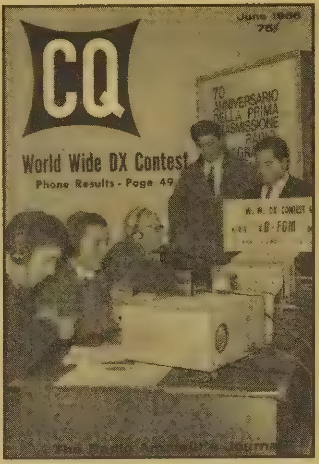
WA2LRO: He seemed to me like a very bright fellow, even if he couldn't pass history. So I told him we needed an assistant editor, and why didn't he go down to the office and talk to the editor?

K2MGA: I said, "Sure, why not? When do you want me there?" It turned out that the day he wanted me down for the interview was the same day I was to be interviewed for readmission to NYU. I flipped a coin to see which it would be, and it came up CQ.

WA2LRO: Well, he came down. Arne Trossman (the editor at the time) interviewed him and hired him on the spot.

K2MGA: The job paid a fortune—$85 a week! That was starting pay for an engineer. I figured, how could I go wrong? I guess it was the right decision. That was 35 years ago and I'm still here. Dick Cowan was an interesting guy to work for. He was always extremely fair to me and extremely generous. And he gave me the most important thing ever—freedom. Freedom to learn and explore and see how things happened and to become part of making them happen.





Ham Radio History *cont.*

OSCAR IV. This was a frequency translator supporting two-way communication over a 10 kHz span on the 2 meter band (uplink) and 432 MHz (downlink). Due to a misfire of the top-stage rocket, the satellite was ejected into an unplanned orbit, and the useful life of the bird was quite short. Even so, the first USA-USSR satellite QSO (K2GUN and UP2ON) was logged, as well as other DX contacts. This opened up a new challenge to amateur radio and raised a number of regulatory questions that would partially be resolved at the next International Telecommunications Conference.

Also in 1965 both amateurs and manufacturers were interested in the Siliconix Field-effect Transistor (FET), advertised as a "substitute for a vacuum tube." Even Siliconix didn't realize the scope of this tiny device. It was a step towards the all-transistorized amateur radio transceiver, which would soon burst upon the scene.

So as 1965 drew to a close, amateur radio seemed in equilibrium. The "battle" between sidebanders and AM operators had subsided; TVI, in the main, was under control; only the Incentive Licensing proposal was unfinished business. There was uneasy guessing and plenty of rumors about what eventually would take place. What effect would rule changes have on the forthcoming International Telecommunications Union Conference?

The market for ham gear had picked up, but the number of newly licensed hams seemed to be slowly decreasing. Was it the CB effect? Was it due to SSB? Perhaps 1966 would provide the answer to this puzzle.

Ham Radio Recession?

In early 1966 *QST* noted that an apparent recession had taken place in amateur radio. There were fewer new licensees and advertising revenue had dropped. What was the problem? There were some plausible answers: the great growth of illegal CB operation and surplus AM ham gear suitable for CB DX, increased fees for ham licenses, the argument over incentive licensing, and the cost of new SSB gear.

And what about the increase in sales of home-entertainment equipment—hi-fi sets and color TV receivers that created a new breed of couch potatoes? Even the Boy Scouts reported a drop in new members. Perhaps the social strain of the Vietnam war had something to do with it. Nobody was sure. In any event, ham radio flowed at a sluggish rate in spite of new gear, new accomplishments, and new interests.

New Circuits and New Transistors

Home builders were happy about the Heath SB-100, a 180 watt HF transceiver kit, and made use of the inexpensive TIXM-101 germanium transistor which worked up to 432 MHz, along with the cheap 2N1212 which provided over 15 watts of power for 160 meter work. There was interest in the newly popularized ferrite baluns, and the G2DAF linear

Joe's Journal *cont.*

year study in Evanston, Illinois, which showed fluoridated drinking water reduces cavities by more than 60%.

Other studies turned up dangers to unborn children when their mothers smoked cigarettes or used the morning-sickness drug DES during pregnancy. DES has been taken off the market. Cigarettes continue to be widely available.

Other drugs that are causing major social and health problems are heroin, which is highly addictive, and LSD, a hallucinogen which became a favorite among hippies who wanted to "turn on, tune in and drop out." There is a growing movement to legalize, or at least decriminalize, the use of marijuana. Its proponents claim the drug is no more harmful than cigarettes. Of course, we're learning all the time just how harmful cigarettes are.

Medicine is also starting to benefit from computers. In just the past couple of years doctors have developed new ways of looking inside the body with so-called CAT scans and Magnetic Resonance Imaging (MRI).

Speaking of computers, we've seen great progress in their development as well. And we're edging ever closer to designing machines that the average person will be able to use. In 1965 the BASIC programming language made it possible t write simple computer programs without an engineering degree. And the computer punch-card has been made obsolete by the introduction of keyboards for data entry (in 1967 and the "floppy disk" for storing programs and data (1970).

Back in 1959 the power of the transistor was magnified a thousand-fold by the integrated circuit. Now a company called Intel has taken the next step. In 1971 it introduced a "microprocessor," a device which combines the functions o many ICs on a single "chip." This should make it possible t develop smaller, faster computers and many things we haven't even imagined yet. Also in 1971 Texas Instruments put rudimentary computers into the public's hands for the first time. TI's pocket calculator weighed over two pounds, cost $150 and could add, subtract, multiply and divide. Just last year Hewlett-Packard introduced a programmable pocket calculator. And *Radio-Electronics* magazine published an article on how to build a "personal computer."

Computers are moving into supermarkets, too. Special labels on certain products are scanned at the cash register b a laser beam (!), which sends the information to a central computer. The computer sends the price back to the cash register and deducts the item from the store's inventory. Th amplifier circuit was popularized in *CQ*, along with an article covering use of Butterworth filter design data.

CQ ran a long series on RTTY by W5VU. VE3CTP wrote a definitive article on a phase-locked oscillator for receivers.

In late September 1966 SSTV tests were run on 20 meters with encouraging results, and K6MYC reported a one-way contact via 2 meter moonbounce with VK3ATN!

The 432 MHz gang made use of the new 2N2395 transistor, which had a noise figure of about 5 dB. This provided an improvement in low-noise front-end design. SSB was a growing interest on 2 meters as well as on 6 meters, and the days of VHF AM seemed numbered.

Ham Gear on the CB Market!

More and more SSB equipment was on the market, while at the same time the AM gear was being phased out. Trade-ins of AM gear in many amateur radio stores quickly found their way to CBers who were taking over many of the aspects of ham radio. On the flip side, many cheap CB rigs were being converted to 10 meter mobile operation by enterprising hams!

The results of the 1966 CQ World-Wide SSB Contest, reported in early 1967, showed conclusively that at least in the DX bands the switch from AM to SSB was complete. AM was gradually relegated to a small number of enthusiasts who banded together to keep this traditional mode of communication alive on spot frequencies in the HF bands.

The design of a complete solid-state amateur receiver by WA7ZOI, WB6AIG, and WA6RDZ was featured in a series of articles in *QST*. This showed that a practical transistorized receiver was possible, and the article paved the way for the commercial receivers to come in the near future. Later in the year W1YLB described in *QST* a transistorized HF transceiver, using tubes only in the transmitter output stage. And so the handwriting was on the wall.

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tores love it, but many people don't trust it. I don't either.

Once you get your computer-scanned food home, you can ook it in a snap in your microwave oven. These were just tarting to appear ten years ago, and then sales really took ff when Amana introduced a compact, practical and afford- ble model in 1967.

The future of flight has arrived as well. Jet airplane travel vas in its infancy a decade ago, but now it's hard to find a ropeller plane on a commercial passenger route. Plus, oday's planes are bigger and faster than ever. The Soviets emonstrated the first supersonic airliner, the TU-144, at the nd of 1968. And the supersonic British-French Concorde nade its maiden flight in 1969. The following year Boeing ntroduced its 747, the first "jumbo jet." It's so big that the Vright Brothers could have made their first flight entirely vithin its fuselage! And airports are busy rebuilding them- elves with high-level terminals and "jetways" which lead rom waiting areas directly to the very high doors of these ery large planes.

The future of television may be less in what you see than n how you get it to your set: In 1967, CBS introduced omething called EVR, Electronic Video Recording. It's a nachine that lets viewers watch movies or pre-recorded

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The "Scratchi" Story

Readers of *CQ* in June 1947 were introduced to a column—and a character—that would be part of *CQ* on and off for the next 24 years: "Scratchi."

Hashafisti Scratchi was a fictional ham—apparently an immigrant from Japan—who regularly wrote letters from his home in "Feenix, Ariz." to "Deer Hon. Ed:" commenting on or lamenting some aspect of "amchoor radio." Scratchi actually predates *CQ*. His column appears in *Radio* magazine (*CQ*'s predecessor) at least as early as 1940 (when he apparently lived near *Radio*'s editorial offices in "Sainted Barbers, Caulif.").

After his first *CQ* appearance in 1947, Scratchi (and occasionally, his brother, Itchi) became a regular from 1948 to 1960 (while sharing space for a few years with another fictional ham, detective Snorlock Ohms), took a brief vacation, and then returned from 1966 to 1971.

When the column returned in 1966, then-editor Dick Ross, K2MGA, wrote: "for many years the name Hashafisti Scratchi has been almost synonymous with confusion and consternation in amateur radio. It seems, too, that whenever the unusual or impossible is happening, Scratchi is there helping it happen."

"Scratchi" is fondly remembered by many long-time *CQ* readers:

"I bought *CQ* magazine at the local newsstand (in the late 1950s) and always read the hilarious misadventures of Scratchi first." —*Arnold W. Sayre, W8WVM*

"I was licensed as KN0DON on January of 1956 in Sioux City, Iowa. I was an avid reader of *CQ* . . . but I especially loved Hashafisti Scratchi." —*Dean Norris, K7NO*

"Itchi and Scratchi were supposed to be two Japanese-American hams who didn't quite have a grasp of English. Their explanations of things were hilarious . . . I don't recall who did the column, but as I said, it was very funny." —*Alfred L., former KN3QCM*

Alfred doesn't remember who wrote "Scratchi" because in the nearly 48 years since the column first appeared in *CQ*, we have never revealed the author's true identity. And we're not going to do it now, either! However, we were very pleased to receive in the mail recently a letter from Hashafisti Scratchi himself. You'll find it elsewhere in this anniversary section.

A Secret Revealed

By George Jacobs, W3ASK

"I can't tell you any secrets because there aren't any secrets to tell."—CQ founding publisher Sanford Cowan.

Well, we found one, revealed now by the Dean of our editorial staff, George Jacobs, W3ASK.

With the 50th anniversary of *CQ* at hand, it is time to disclose a long-kept secret. Each April between 1964 and 1970 *CQ* printed special propagation articles by Prof. Jerzy Ostermond-Tor. While these articles were written with some degree of tongue-in-cheek to match the month, they contained provocative views of the possible future of amateur radio. All of Dr. Ostermond-Tor's articles made scientific history of sorts. For example, his article "Ionospheric Amplification" helped rekindle interest in low-power DX. In a two-part article entitled "Special Subscriber Service: The Telephone Company's Answer to Amateur Radio," he prophetically predicted what is today's computer E-mail, and the competition it would have with amateur radio. With *CQ* celebrating its 50th anniversary, it is time to let the cat out of the bag and confess that Prof. Tor was my creation and that I wrote these articles. I found them especially enjoyable to do, since rather than fool or deceive, I wove together fact, fiction, and humor to get a message across that might have been difficult, if not impossible, to do in a straight article.

Ham Radio History *cont.*

More Solid-State Gear For Hams!

Iambic and squeeze keyers for improved CW operation surfaced in 1967, as well as W5QJR's Antenna Noise Bridge. W6SAI and WA6BAN wrote a definitive article on grounded grid linear amplifiers for *QST*, and in the winter of 1966–67 W8VVD described an add-on transmitter in *CQ*: an exciter, a power amplifier, and finally an SSB adapter. This was an ideal design, as it could be done as a step-by-step construction project. For the SSB operator National brought out the model 200 HF SSB transceiver for $359, and *CQ* reviewed the popular Swan 250 SSB 6 meter transceiver.

Earlier, in 1957, a group of scientists at the University of Illinois developed a family of wideband log-periodic antennas. These were of little interest to amateurs until the dipole variation of this design was covered in a two-part article in *CQ* in late 1967. However, no one stepped forward to build an HF version for the ham bands. That was to come later.

The Decision on Incentive Licensing, At Last!

On August 24, 1967 a landmark decision was announced by the Federal Communications Commission settling the incentive licensing controversy that had been hanging over the head of amateur radio since 1963. The confusion, misinformation, and rumors spread on the air, in magazines, and in club bulletins that partially contributed to the drop in amateur interest and equipment sales seemed over. Amateurs finally knew what they could and could not do. The onerous proposal of separate call signs for each class of

Joe's Journal *cont.*

videotapes at home. And it gives you control over the program, including the ability to stop and start, go fast-forward, rewind and play in reverse. I guess its success or failure will depend on how many movies and other programs will be made available on the tape cartridges the machine plays.

Also on the horizon is the growth of cable television. Up until now cable has generally been a way for people in fringe areas to get improved reception. But a combination of relaxed FCC rules and RCA's plan to launch a domestic communications satellite later this year could create a whole new way of delivering programs to your TV set. It might also provide viewers with real choices, rather than simply picking whatever's on ABC, CBS or NBC.

So much for the good stuff. This decade will likely be remembered more for what went wrong than it will be for what went right.

At the end of 1964 there were 23,000 American soldiers in Vietnam, helping the South Vietnamese fight Communist rebels, and authorized to shoot back if they were attacked. But President Johnson and his military commanders saw that the effort was going nowhere, and they sharply escalated our involvement, first by bombing North Vietnam in hopes of forcing them to negotiate peace, then by authorizing US commanders to send our troops into combat.

By the end of 1965 our 23,000 soldiers had grown to 125,000. A year later our total forces there reached 358,000. And by the end of 1967 we had 474,300 troops in Vietnam—1,500 more than were in Korea at the peak of our involvement there. The U.S. commander there, General William Westmoreland, said "we are winning a war of attrition" in Vietnam and predicted that a pullout of U.S. forces would begin within two years.

But in early 1968, despite the overwhelming numbers of US troops, the Communist Viet Cong launched what became known as the Tet Offensive, seemingly attacking everywhere at once and even reaching the South Vietnamese capital of Saigon.

Militarily, the Viet Cong were no match for the Americans, but they won a vital psychological victory here at home. Until Tet, the anti-war movement in the United States was centered on a small group of radicals. But this major blow at our technologially-superior forces made millions of Americans doubt the wisdom of our efforts there. College students in particular rallied around the cause of ending U.S. involvement in Vietnam. Draft resistance increased, and anti-war demonstrations, which had begun in license was dropped. The Novice license was extended to two years, and VHF phone privileges for Novices were dropped. The incentive clause in the restructuring scheme specified frequency privileges in the HF bands applied to each license class. This was to be phased in over a period of time. In addition, old-time Extra Class hams could apply for a two-letter call for $20.

Most amateurs accepted the new docket with a sigh of relief. The waiting was over. The split-band proposal of *CQ*, outlined in the editorial of March 1964, was partially adopted, and while few were fully satisfied with the overall solution, the general opinion expressed by letters to the editor of the main amateur radio magazines seemed to indicate that the FCC had handled the problem in a fair and intelligent manner. At last, amateur radio could put that divisive event behind and proceed towards a happy future!

Ham Radio Enters the World of Today

In 1968 WB6IOM built a striking cavity amplifier for 1296 MHz using a 2C39 tube, while the March *QST* featured the use of integrated circuits in ham gear, such as keyers and VOX circuits. In June a full-page ad in amateur radio magazines announced the Yaesu FT-DX400 receiver. Other ads touted surplus FM gear for 420 MHz, as interest in that band slowly grew.

In the fall of that year SSTV was authorized by the FCC, and a review of phone patch circuits (still a cloudy issue) ran in *CQ*. The UPX-6 surplus 1296 MHz transponder, with three cavities, was a quick seller, as was the Heath "Hot Water 17," a 2 meter AM transceiver kit for $130.

The sunspot cycle advanced rapidly in the early months of 1968, and DX interest picked up. Ten meters, the mother-lode of ham radio, would soon spring to life, and that was a good omen!

Another important milestone in ham radio occurred in

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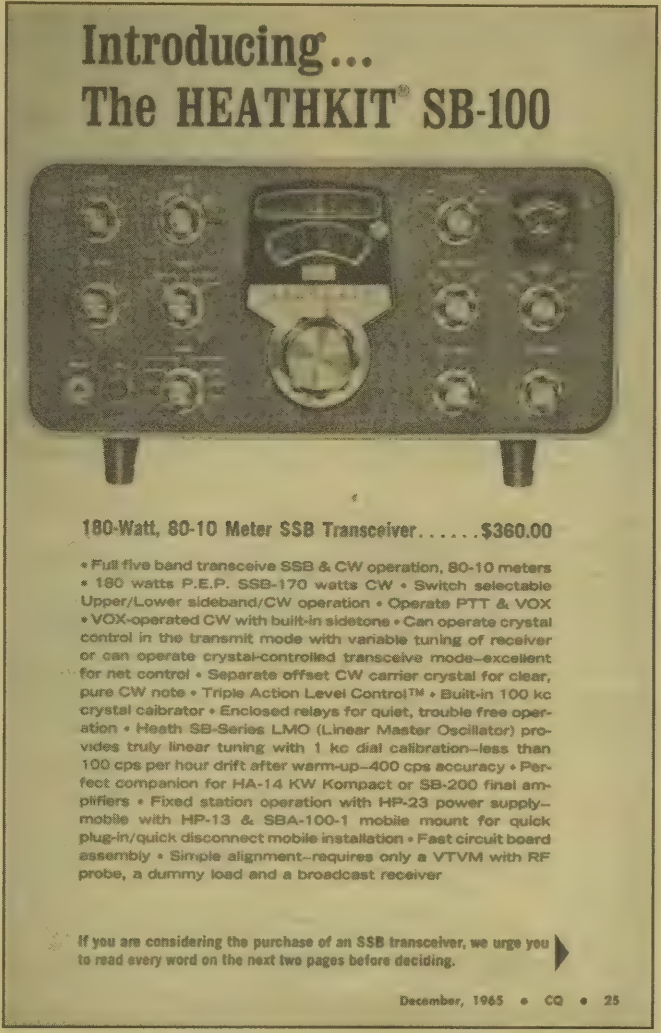

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180-Watt, 80-10 Meter SSB Transceiver......$360.00

• Full five band transceive SSB & CW operation, 80-10 meters • 180 watts P.E.P. SSB-170 watts CW • Switch selectable Upper/Lower sideband/CW operation • Operate PTT & VOX • VOX-operated CW with built-in sidetone • Can operate crystal control in the transmit mode with variable tuning of receiver or can operate crystal-controlled transceive mode—excellent for net control • Separate offset CW carrier crystal for clear, pure CW note • Triple Action Level Control™ • Built-in 100 kc crystal calibrator • Enclosed relays for quiet, trouble free operation • Heath SB-Series LMO (Linear Master Oscillator) provides truly linear tuning with 1 kc dial calibration—less than 100 cps per hour drift after warm-up—400 cps accuracy • Perfect companion for HA-14 KW Kompact or SB-200 final amplifiers • Fixed station operation with HP-23 power supply—mobile with HP-13 & SBA-100-1 mobile mount for quick plug-in/quick disconnect mobile installation • Fast circuit board assembly • Simple alignment—requires only a VTVM with RF probe, a dummy load and a broadcast receiver

If you are considering the purchase of an SSB transceiver, we urge you to read every word on the next two pages before deciding.

December, 1965 • CQ • 25

1967, drew bigger and bigger crowds.

The pressure to end the war grew so strong so quickly that by the end of March 1968 President Johnson ordered a halt to the bombing of North Vietnam as a peace gesture, and announced that he would not seek re-election in November. Preliminary peace talks began in Paris, but U.S. involvement continued to grow, and so did the anti-war movement.

There were huge demonstrations outside the Democratic National Convention in Chicago, and Mayor Richard Daley sent club-wielding police to break them up. The images were flashed into our living rooms on the evening news and even TV reporters were roughed up and arrested. Opposition to the war grew even stronger.

TV pictures from Vietnam also helped fuel the opposition, especially images such as those of U.S. soldiers using cigarette lighters to burn down an entire village, and the revelation that American troops had massacred virtually the entire population of the village of My Lai. The leader of those troops, Lt. William Calley, was later court-martialed and convicted of mass murder.

Here at home many people are treating Vietnam veterans as though they're all criminals, and that the whole war, and our failure to win it, was their fault. I think it's shameful and I hope that someday we can make it up to them.

In November 1968 former Republican Vice-President Richard Nixon, campaigning on a platform of "peace with honor," narrowly defeated Democratic Vice-President Hubert Humphrey for the Presidency. Soon after Nixon took office, the number of U.S. troops in Vietnam peaked at over 542,000. A slow withdrawal began in August as peace talks continued but made little progress (there was tremendous debate over the shape of the negotiating table!).

But the pace of withdrawal was too slow for those who opposed the war. There was a huge anti-war "moratorium" in October 1969, followed by a march on Washington in November that drew a crowd estimated at 250,000. In April of 1970 President Nixon ordered U.S. troops to invade Cambodia to cut off supply lines to the Viet Cong. Another round of protests followed, and on May 4 nervous and poorly-trained National Guardsmen shot and killed four unarmed students at Kent State University in Ohio. Six weeks later Congress repealed the 1964 Gulf of Tonkin resolution, which had authorized our use of military force in Vietnam. It took another three years, though, to complete the withdrawal of U.S. forces. And many prisoners of war and so-called "MIAs"—Missing In Action—are still unaccounted for.

Vietnam wasn't the only hot spot in the past ten years. There have been two wars in the Middle East. In 1967, amid

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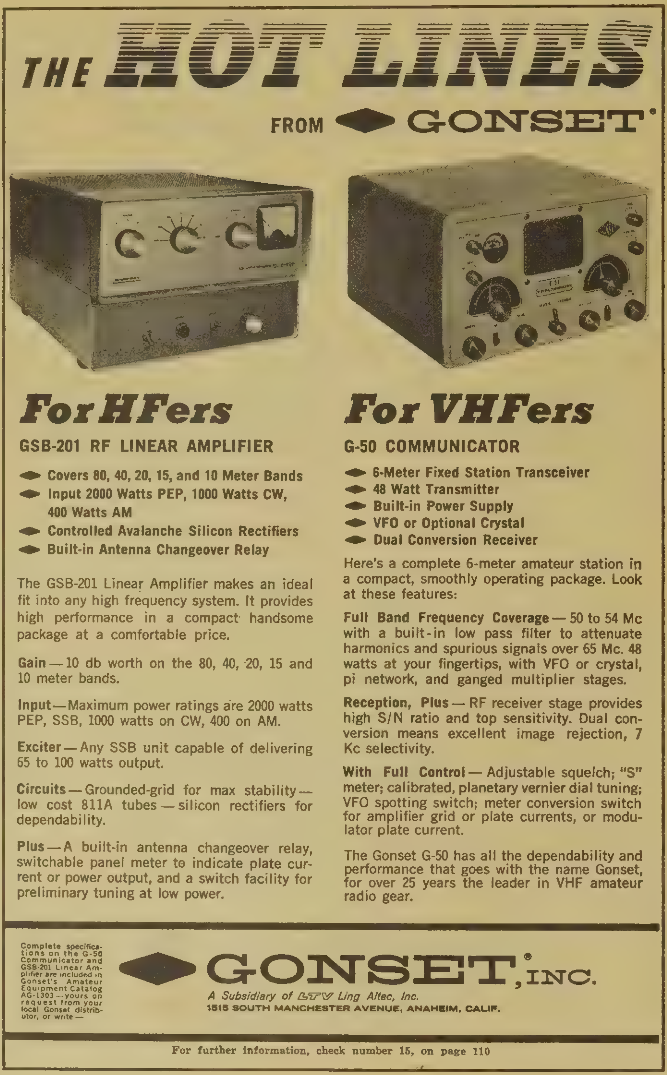

THE HOT LINES

FROM GONSET

For HFers

GSB-201 RF LINEAR AMPLIFIER

- Covers 80, 40, 20, 15, and 10 Meter Bands
- Input 2000 Watts PEP, 1000 Watts CW, 400 Watts AM
- Controlled Avalanche Silicon Rectifiers
- Built-in Antenna Changeover Relay

The GSB-201 Linear Amplifier makes an ideal fit into any high frequency system. It provides high performance in a compact handsome package at a comfortable price.

Gain—10 db worth on the 80, 40, 20, 15 and 10 meter bands.

Input—Maximum power ratings are 2000 watts PEP, SSB, 1000 watts on CW, 400 on AM.

Exciter—Any SSB unit capable of delivering 65 to 100 watts output.

Circuits—Grounded-grid for max stability—low cost 811A tubes—silicon rectifiers for dependability.

Plus—A built-in antenna changeover relay, switchable panel meter to indicate plate current or power output, and a switch facility for preliminary tuning at low power.

For VHFers

G-50 COMMUNICATOR

- 6-Meter Fixed Station Transceiver
- 48 Watt Transmitter
- Built-in Power Supply
- VFO or Optional Crystal
- Dual Conversion Receiver

Here's a complete 6-meter amateur station in a compact, smoothly operating package. Look at these features:

Full Band Frequency Coverage—50 to 54 Mc with a built-in low pass filter to attenuate harmonics and spurious signals over 65 Mc. 48 watts at your fingertips, with VFO or crystal, pi network, and ganged multiplier stages.

Reception, Plus—RF receiver stage provides high S/N ratio and top sensitivity. Dual conversion means excellent image rejection, 7 Kc selectivity.

With Full Control—Adjustable squelch; "S" meter; calibrated, planetary vernier dial tuning; VFO spotting switch; meter conversion switch for amplifier grid or plate currents, or modulator plate current.

The Gonset G-50 has all the dependability and performance that goes with the name Gonset, for over 25 years the leader in VHF amateur radio gear.

Complete specifications on the G-50 Communicator and GSB-201 Linear Amplifier are included in Gonset's Amateur Equipment Catalog AG-1303—yours on request from your local Gonset distributor, or write—

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For further information, check number 15, on page 110

Ham Radio History *cont.*

1968: Skip Tenney, W1NLB, announced the publication of *Ham Radio* magazine, soon to be recognized as the technical voice of amateur radio. No DX news or contests in this publication! Just first-rate technical dope, including data on the new dual-gate MOSFETs. An interesting ad in *Ham Radio* run by Hewlett-Packard featured the new HP-21 scientific calculator ($125) for the home engineer and equipment builder. Goodbye to the trusty slide rule!

The Pace Quickens

The February 1969 cover of *CQ* featured the 12-element, 20 meter Yagi of WA6ZZK. Many hams envied this antenna, but few had the space to swing a 152 foot boom! The DXers were delighted with the new prefixes that had sprung up on the air: UZ0, C3, C21, JD1, 4L0, CW3. Wow! Things were lookin' good on the DX bands! And the new Delta Loop antenna might just be the sky-wire to snag some of this good stuff!

In spring of that year the Signal-One transceiver was advertised. It had a nixie-tube readout to 100 Hz, and was all solid-state except for the output tube; it foretold of equipment advances on the horizon. The Galaxy R-350 receiver featured a novel phase-locked loop (PLL) that provided exceptional frequency stability. And the Inoue FDFM 2 meter, 6 channel FM transceiver signaled the introduction of the Japanese manufacturers into the VHF market.

Raytheon quit the receiving tube business in 1969, and the remaining stock of their tubes were sold quickly at 70% off list. On the other side of the coin, RCA announced the dual-gate MOSFET 40673, useful in receivers up into the VHF region.

Two meter FM and repeaters were catching on nicely. There were plenty of surplus joints selling used Motorola gear. And old surplus still existed. You could still buy ARC-5 equipment left over from World War II!

Joe's Journal *cont.*

mobilizations by surrounding Arab armies, Israel launched a lightning attack against Egypt, Syria and Jordan, capturing the Sinai Peninsula, the West Bank including the old city of Jerusalem and Syria's Golan Heights, all in six days. Six years later Egypt and Syria launched a surprise attack on Israel during the Jewish holiday of Yom Kippur, the holiest day on the Jewish calendar. The Israelis initially lost ground, but were moving toward Damascus and Cairo when all sides accepted a U.S.-brokered cease-fire.

The impact of this latest Mideast war was felt directly here at home. The mostly-Arab members of OPEC, the Organization of Petroleum Exporting Countries, perceived a pro-Israel tilt by the United States, and imposed an oil embargo on us. The result was long gas lines, rationing and a doubling of fuel prices.

India and Pakistan went to war with each other twice in the past decade as well. In 1965 Pakistan tried unsuccessfully to take over the Indian province of Kashmir; and in 1971, when East Pakistan declared independence from West Pakistan, India sent in troops to support the newly-formed nation of Bangladesh. Two-hundred fifty-thousand people were killed in the war; another six million fled the country, which just last year lost thousands more to famine.

In 1968 Eastern Europe saw a near-replay of the 1956 Hungarian revolution. But this time it was the Communist government of Czechoslovakia which was loosening restrictions on its citizens' freedoms. The Soviets apparently were unwilling to accept any cracks in the iron curtain. And once again, Russian tanks settled the matter in Moscow's favor.

Although U.S.-Soviet relations were a little chilly after the Czech invasion, we've managed to avoid coming head-to-head with the Russians in the past ten years. In fact, President Johnson had a summit meeting in 1967 with Alexei Kosygin, and President Nixon met twice with Leonid Brezhnev, who has emerged as the Kremlin's top man. And in 1972 Nixon even became the first U.S. President to visit Communist China.

President Nixon did better in dealing with foreign policy than with problems here at home. In 1970 the economy went into the deepest recession since World War II, coupled with double-digit inflation. It's still with us, despite Nixon's freeze on wages and prices, devaluation of the dollar overseas and elimination of the last vestiges of the gold standard.

The recession is still with us, but President Nixon isn't. Last year he became the first President ever to resign in dis-

The amateur satellite program received a big boost in June when AMSAT (the Radio Amateur Satellite Corporation) was formed in Washington, DC to advance various Oscar projects that would require a nonmilitary launching platform. No one could foretell the rapid growth of AMSAT and the worldwide interest in amateur satellites to come in the future.

News magazines and newspapers took note of the amateur's contribution to the communication mounted for Hurricane Camille, which once again highlighted the radio amateur's ability to respond to natural disasters.

All in all, 1969 was a good year for amateur radio, and *CQ* had something to look forward to in 1970.

Happy 25th Anniversary, *CQ* Magazine!

In 1970 *CQ* celebrated its 25th anniversary with a gala January issue. There were other things to celebrate, too. The OSCAR 5 satellite was in orbit, and it was first heard by 5R8AS. This was the first "bird" made outside the USA—in Australia, to be exact.

In February the FCC proposed a new license fee structure: $9 for a new or renewed license, and for $25 you could get a special call. Critics complained that the FCC was turning into a supermarket for amateur licenses. *CQ* noted in its September editorial that over a period of the last year or so there had been a drop in the number of amateur radio distributors, the "mom and pop" stores fading out as the big distributors grew. A lot of private-label gear was coming in from Japan and Hong Kong, and some US manufacturers were going to factory-direct-to-consumer sales to remain in the game.

The Japanese equipment continued to be a strong force in the market. Henry Radio introduced the Tempo-One transceiver; the Yaesu FTdx-560 was advertised in June, and in December the famous Yaesu FT-101 appeared on the market. Among the domestic manufacturers, Heath announced the SB-220 linear amplifier, and Ten-Tec caught the fancy of the QRP gang with the PM-1 CW transceiver (2 watts on 80 and 40 meters) for $49.95. At the close of the year Heath featured the HW-100, a traditional tube-type SSB transceiver plus the IB-101 frequency counter, good to 15 MHz. The Curtis iambic keyer with a three-message memory also appeared on the market.

Project of the month A Transistor RTTY Terminal Unit Pg 16
CQ
The Radio Amateur's Journal

DXers were happy when the sunspot numbers peaked once again, providing outstanding DX on 10 and 6 meters.

1971—The Year of FM and Repeaters

The amateur radio market got a big boost in 1971 with the explosion of interest in FM and repeaters. The February issue of *CQ* was devoted to VHF/FM, and soon thereafter the Standard C-826M, 12-channel FM transceiver hit the stores. The "Bearcat" scanner, covering 8 FM channels, was another popular item. In July *CQ* ran a 12-page catalog for Gregory Electronics, devoted to surplus FM gear easily adapted to the VHF ham bands. FM was here to stay and was destined

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grace. It all started several months before the 1972 election—which Nixon won in a landslide—when five men were arrested at the Democratic National Committee's headquarters in Washington's Watergate Hotel. White House Press Secretary Ron Ziegler dismissed it as a "third-rate burglary." However, it turned out that the men, who were trying to "bug" the Democrats' phones, were working for Nixon's reelection committee.

Top White House officials, apparently including the President himself, tried to cover up their involvement. But everything began to unravel, and by the summer of 1974 President Nixon, who had told the American people a year earlier "I am not a crook," found himself named an "unindicted co-conspriator" by a federal grand jury. When the House Judiciary Committee voted articles of impeachment against him, Nixon resigned.

The man who was elected Vice-President in 1972 did not succeed him. In 1973 Vice President Spiro Agnew resigned and pled no contest to tax evasion charges which stemmed from bribes he accepted while Governor of Maryland. In the first use of the 25th Amendment to the Constitution (passed after JFK's assassination, when President Johnson was left with no Vice-President), House Minority Leader Gerald Ford was appointed to the Vice-Presidency and confirmed by Congress. Less than a year later Ford was President—the first man to occupy the White House who had never been elected to national office.

Assassinations unfortunately continued to be part of our national landscape in the past ten years. Black militant leader Malcolm X was killed in 1965; 1968 saw the shooting deaths of civil rights leader Martin Luther King, Jr., who had dedicated his life to non-violence; and Robert F. Kennedy, JFK's brother and at the time the leading candidate for the Democratic Presidential nomination. Four years later Alabama Governor George Wallace, also campaigning for President, was shot and wounded by a would-be assassin.

Martin Luther King's assassination touched off weeks of urban rioting, but they were only part of a pattern of race-related riots that began three years earlier in the Watts section of Los Angeles. Watts erupted in violence again in 1966. And the "long hot summer" of 1967 was marked by racial violence in more than 65 American cities. The worst riots were in Detroit and Newark, New Jersey.

All of this was in stark contrast to the largely peaceful and largely successful demonstrations in the south led by Dr. King. After he and 2,600 other black protesters were arrested during a voter registration drive in Selma, Alabama in 1965, a huge protest march from Selma to Birmingham fol-

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Power Mite PM-1

the $49.95 quality transceiver

The wonderful world of CW is yours for a fraction of what you'd expect to pay! Precision Ten-Tec craftsmanship is comparable to that of the highest priced transceivers. Transceive operation on 80 and 40 meters, crystal operation on 80, 40 and 15 meters. 15 meter receiving converter available. Mounting and necessary cabling is included in the PM-1.

Check these other features: 12-volt lantern battery power, front-panel band switching with flywheel tuning on slide rule dial, 250-2500 Hz shaped audio, metered power amplifier stage, all-silicon transistors with integrated circuit, 2 kHz receiving band width, 2 watts input to final stage, 100 cycles drift with no warm-up.

Designed for the critical operation of the novice or veteran interested in QRP or portable. 4" H × 6" D × 10" W.

MODULES

Basic PM-1 circuit modules, tuning dial, instructions for bread board mounting and interconnecting. Completely wired $29.95

A Complete Line of Ten-Tec Accessories are Comparably Priced.

If your distributor does not have in stock, order direct from factory, postage prepaid. Send check or money order. Tennessee residents add 3% Sales Tax.

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Please rush my free copy of the new, complete TEN-TEC catalog.

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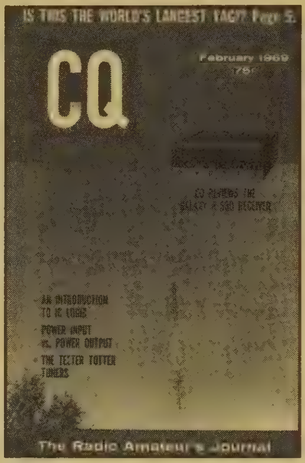
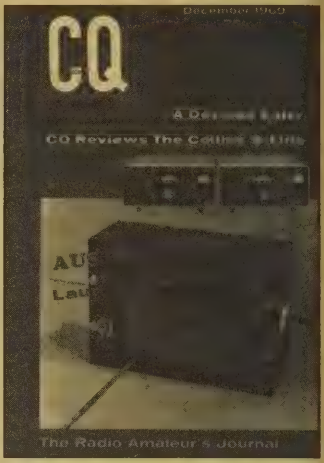


IS THIS THE WORLD'S LARGEST YAGI? Page 5
CQ
February 1969
75¢
CQ REVIEWS THE GALAXY R-530 RECEIVER
AN INTRODUCTION TO IC LOGIC
POWER INPUT vs. POWER OUTPUT
THE TEETER TOTTER TUNERS
The Radio Amateur's Journal



Ham Radio History *cont.*

to play an important role in the growth of amateur radio.

Other clues pointed to a quickening pace in amateur radio. The Kenwood R-599/T-599 "twins" for HF SSB were introduced, and the Drake DSR-1 receiver, with 100 Hz readout, covering 10 kHz to 30 MHz was advertised. The "Robyn" transceiver, with digital readout, looked suspiciously like a Kenwood product, and it offered advantages not available in American-made products. Not many distributors handled this novel rig, and it soon faded from the marketplace, reappearing shortly under the SBE (Linear Systems) logo.

In August 1971 *Ham Radio* featured a state-of-the-art 2 kW PEP linear amplifier for 2 meters using an 8877 triode. The amplifier was built by W6UOV (now W6PO). It was widely duplicated by hams and commercial manufacturers.

Anyone For Dayton?

Amateur radio seemed alive and well in Ohio when the 1971 Dayton Hamvention hit a new high in registration: 4700

Joe's Journal *cont.*

lowed. And Congress followed up with the Voting Rights Act of 1965. Today most, if not all, of the legal barriers that kept blacks from equality have been struck down. But the economic barriers remain, and bigotry remains. Those are a lot harder to change than laws.

In many parts of our country the law still treats women differently from men. Following the lead of the civil rights movement, women's groups have begun to organize and demand equality. In 1972 Congress passed the Equal Rights Amendment. It needs to be approved by at least three-quarters of the states to become part of the Constitution. It still has a long way to go, and there's a growing anti-ERA movement. Surprisingly, some of its most vocal leaders are women.

One outgrowth of the women's movement was a Supreme Court decision in 1973 which legalized abortion in the early stages of pregnancy. If anything, the ruling seems to have fueled debate on the issue rather than settling it.

There's a lot more that happened in the past ten years—important events such as ecology and environmental laws, airplane hijackings and the murder of eleven Israeli athletes at the 1972 Olympics. There have also been exciting events such as Mark Spitz winning seven gold medals at the same Olympics, Secretariat winning horse racing's triple crown (the first since 1948), Cassius Clay's remarkable boxing comeback as Muhammad Ali, the start of the Super Bowl and Hank Aaron breaking Babe Ruth's all-time home-run record. But I've gone on too long already. And I think that looking back, this decade will be remembered most for three things: the moon, Vietnam and Watergate.

What will the next decade bring? Well, it's always easier to predict the past than the future. I just found an old issue of *Time* magazine from May 1965, which I saved for an article about the Early Bird satellite. That article included a variety of predictions for the near future. Some were accurate, but others remain in the realm of science fiction. For example: "Data transmission will bring the skills of giant computers to anyone who needs them. The computers themselves will join forces in a vast network." We have to get the darned things to work on their own before we start hooking them together!

But who knows what'll happen in the next ten years? I hope to be here then to report. Until then, 73.

(Researched & Written by Richard S. Moseson, NW2L)

hams! Surely it would be difficult to surpass this amazing convocation of enthusiasts! *(For the uninitiated, Dayton today averages an annual attendance of over 30,000!—ed.)*

DX was good. The report of the 1970 CQ World-Wide DX Phone Contest listed PA9AF and OH5SM, multi-operator stations with 4.5 and 6.4 million points! That was a lot of talking! The fall DX season got off with the appearance of 3C0AN, operated by a group of OH hams (that's Finland, not Ohio). Over 300 QSOs per hour were achieved by this well-organized DXpedition.

One high point of 1971 was the World Administrative Radio Conference, which formally recognized amateur space communications and set apart exclusive sections of various amateur bands for that service. This gave a big boost to space enthusiasts!

Some of the ambiguity as to the direction amateur radio was taking was reflected in the full-page, rear-cover ads of RCA in *CQ* and *QST*. Originally devoted to featuring RCA receiving and transmitting tubes of interest to amateurs, the ads wandered about between test equipment, RCA hobby books, antenna rotors, transistors, and catalogs. By early '72 the RCA ads dropped from the magazines.

In the fall of 1971 *CQ* featured two articles by W6SAI that boosted a long-time interest in old-time ham gear. The first reviewed the famous old National SW-3 receiver, and the second was a construction article on a 40 watt, 1934-style, 80 meter CW transmitter. Both articles were big hits.

Charge It On Your Credit Card!

A careful reader of the 1972 amateur radio magazines would note that ham distributors were now accepting Bank of America and Master Charge credit cards. Would the 800-phone number be far behind?

The surplus ads in the magazines were confusing to many. Some surplus dealers were still selling World War II gear (BC-348s, SCR-274N, APR4, etc.), while others were pleading to buy more recent military communication equipment. It crossed the minds of many hams that eventually the surplus stores would buy and sell among themselves, and no customers would be needed!

In March 1972 *CQ* printed a list of 2 meter repeaters: 310 in the USA and 52 in Canada! The repeater boom was in full swing, boosted by a lot of new FM gear. The Sonar, 5-channel HT sold for about $450, along with the Standard 2 meter repeater for $640. And there were dozens of ads for VHF amplifier "bricks" ranging up to 50 watts power. Yaesu had the new FT-2 autoscan on the market, and VHF interest was boosted by the launch of OSCAR 6, a repeater (2 meters up, 10 meters down).

VHF hams were interested in the array of four 13-element Yagis for 432 MHz. Described in *Ham Radio* by W2CQH, the monster would provide over 17.5 dBi gain!

Japanese supremacy in the amateur radio equipment market was becoming a reality. The Kenwood TS-511 and Yaesu FTdx-570 were big sellers. Plenty of imported FM gear was available, and new repeaters came on the air every day. Because of QRM, the FCC finally formalized VHF sub-bands for the repeaters.

Bucking the VHF trend, the KS4KZ DXpedition to Seranna Bank attracted a lot of attention on the HF bands, as did the new SSTV column by WA2FLJ in *CQ*. W2DD had a *CQ* feature article on color SSTV. The times, they were a-changing!

Tubes started to disappear from construction articles, and by 1973 amateur radio presented a picture that today's new amateur would have felt comfortable with. It was interesting to note that in 1973 a *CQ* survey showed that 25 percent of all dollars spent by hams was spent on VHF FM equipment, which accounted for a third of all units purchased.

Many new prefixes showed up on the DX bands: A4F, DX40, IC8, IV5. These kept the award hunters hopping! In

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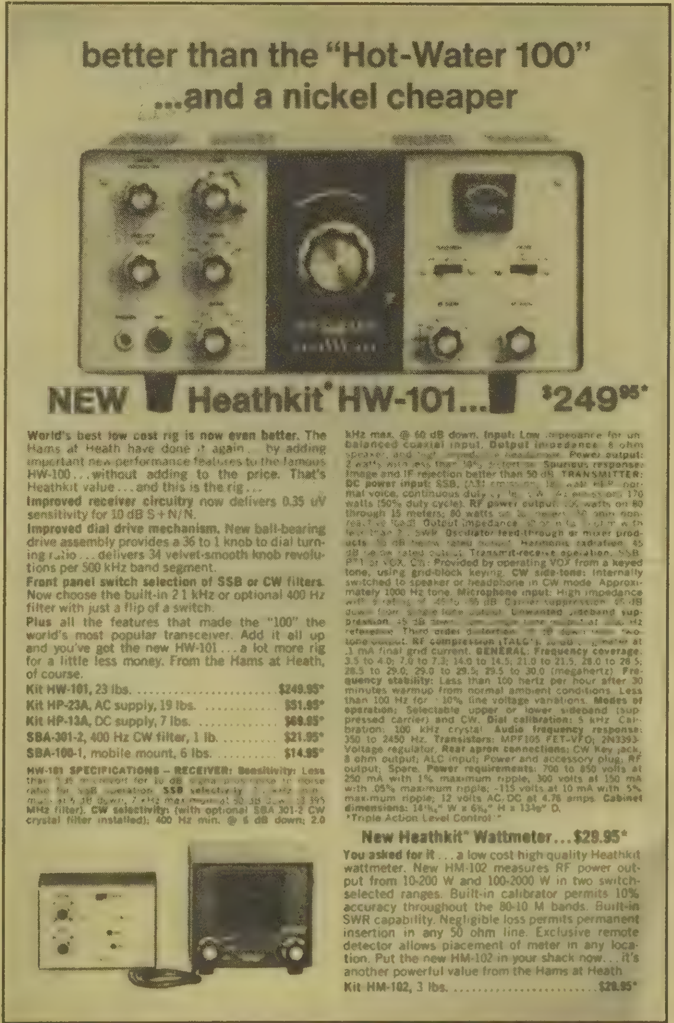

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NEW Heathkit® HW-101... $249⁹⁵*

World's best low cost rig is now even better. The Hams at Heath have done it again ... by adding important new performance features to the famous HW-100 ... without adding to the price. That's Heathkit value ... and this is the rig ...

Improved receiver circuitry now delivers 0.35 uV sensitivity for 10 dB S+N/N.

Improved dial drive mechanism. New ball-bearing drive assembly provides a 36 to 1 knob to dial turning ratio ... delivers 34 velvet-smooth knob revolutions per 500 kHz band segment.

Front panel switch selection of SSB or CW filters. Now choose the built-in 2.1 kHz or optional 400 Hz filter with just a flip of a switch.

Plus all the features that made the "100" the world's most popular transceiver. Add it all up and you've got the new HW-101 ... a lot more rig for a little less money. From the Hams at Heath, of course.

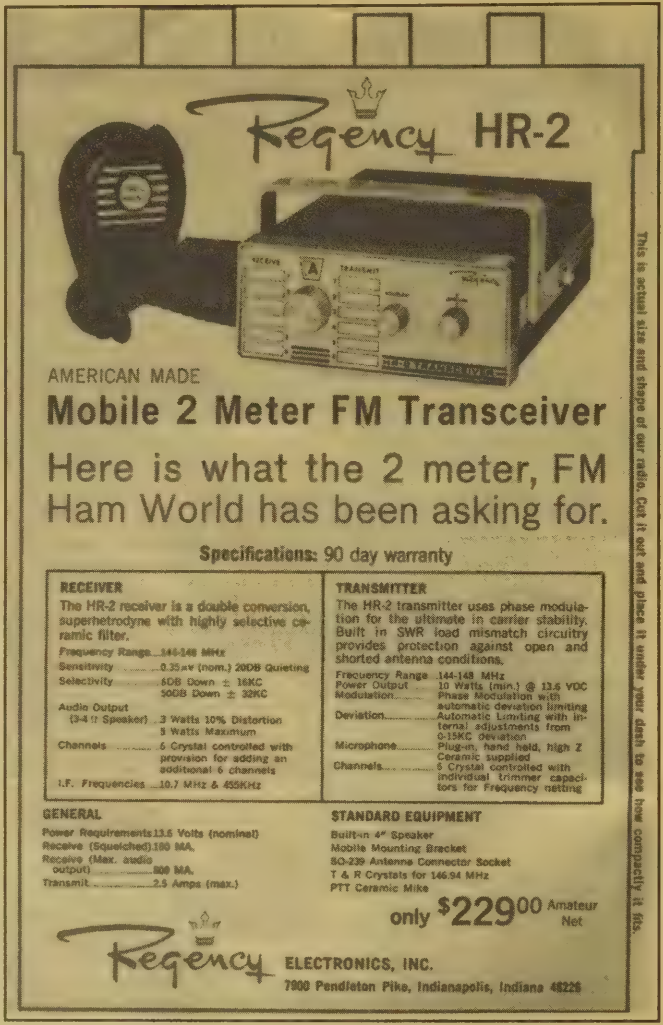
Kit HW-101, 23 lbs.	$249.95*
Kit HP-23A, AC supply, 19 lbs.	$51.95*
Kit HP-13A, DC supply, 7 lbs.	$69.95*
SBA-301-2, 400 Hz CW filter, 1 lb.	$21.95*
SBA-100-1, mobile mount, 6 lbs.	$14.95*

HW-101 SPECIFICATIONS — RECEIVER: Sensitivity: Less than [illegible] for 10 dB signal plus noise to noise ratio for SSB operation. **SSB selectivity:** [illegible] MHz filter). **CW selectivity:** (with optional SBA 301-2 CW crystal filter installed); 400 Hz min. @ 6 dB down; 2.0 kHz max. @ 60 dB down. **Input:** Low impedance for unbalanced coaxial input. **Output impedance:** 8 ohm speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB. **TRANSMITTER: DC power input:** SSB: [illegible] normal voice, continuous duty [illegible] 170 watts (50% duty cycle). **RF power output:** [illegible] watts on 80 through 15 meters; 80 watts on 10 meters [illegible]. **Output impedance:** [illegible]. **Oscillator feed-through or mixer products:** [illegible] dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** SSB: [illegible]. CW: Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker or headphone in CW mode. Approximately 1000 Hz tone. **Microphone input:** High impedance with a rating of -45 to -55 dB. **Carrier suppression:** 45 dB down from single tone output. **Unwanted sideband suppression:** 45 dB down [illegible] Hz reference. **Third order distortion:** [illegible] down from two-tone output. **RF compression (TALC*):** [illegible] at .1 mA final grid current. **GENERAL: Frequency coverage:** 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Frequency stability:** Less than 100 hertz per hour after 30 minutes warmup from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial calibration:** 5 kHz. Calibration: 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz. **Transistors:** MPF105 FET-VFO; 2N3393 Voltage regulator. **Rear apron connections:** CW Key jack, 8 ohm output; ALC input; Power and accessory plug; RF output; Spare. **Power requirements:** 700 to 850 volts at 250 mA with 1% maximum ripple; 300 volts at 150 mA with .05% maximum ripple; -115 volts at 10 mA with 5% maximum ripple; 12 volts AC/DC at 4.76 amps. **Cabinet dimensions:** [illegible] W x [illegible] H x [illegible] D.
*Triple Action Level Control™

New Heathkit® Wattmeter...$29.95*

You asked for it ... a low cost high quality Heathkit wattmeter. New HM-102 measures RF power output from 10-200 W and 100-2000 W in two switch-selected ranges. Built-in calibrator permits 10% accuracy throughout the 80-10 M bands. Built-in SWR capability. Negligible loss permits permanent insertion in any 50 ohm line. Exclusive remote detector allows placement of meter in any location. Put the new HM-102 in your shack now... it's another powerful value from the Hams at Heath

Kit HM-102, 3 lbs.	$29.95*



This is actual size and shape of our radio. Cut it out and place it under your dash to see how compactly it fits.

Regency HR-2

AMERICAN MADE

Mobile 2 Meter FM Transceiver

Here is what the 2 meter, FM Ham World has been asking for.

Specifications: 90 day warranty

RECEIVER

The HR-2 receiver is a double conversion, superhetrodyne with highly selective ceramic filter.

Frequency Range	144-148 MHz
Sensitivity	0.35μv (nom.) 20DB Quieting
Selectivity	6DB Down ± 16KC 50DB Down ± 32KC
Audio Output (3-4 Ω Speaker)	3 Watts 10% Distortion 5 Watts Maximum
Channels	6 Crystal controlled with provision for adding an additional 6 channels
I.F. Frequencies	10.7 MHz & 455KHz

TRANSMITTER

The HR-2 transmitter uses phase modulation for the ultimate in carrier stability. Built in SWR load mismatch circuitry provides protection against open and shorted antenna conditions.

Frequency Range	144-148 MHz
Power Output	10 Watts (min.) @ 13.6 VDC
Modulation	Phase Modulation with automatic deviation limiting
Deviation	Automatic Limiting with internal adjustments from 0-15KC deviation
Microphone	Plug-in, hand held, high Z Ceramic supplied
Channels	6 Crystal controlled with individual trimmer capacitors for Frequency netting

GENERAL

Power Requirements	13.6 Volts (nominal)
Receive (Squelched)	100 MA.
Receive (Max. audio output)	800 MA.
Transmit	2.5 Amps (max.)

STANDARD EQUIPMENT

- Built-in 4" Speaker
- Mobile Mounting Bracket
- SO-239 Antenna Connector Socket
- T & R Crystals for 146.94 MHz
- PTT Ceramic Mike

only 229^{00} Amateur Net

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7900 Pendleton Pike, Indianapolis, Indiana 46226

Ham Radio History *cont.*

addition, Bouvet Island was on the air, as well as SY1MA/Mount Athos! DX Heaven!

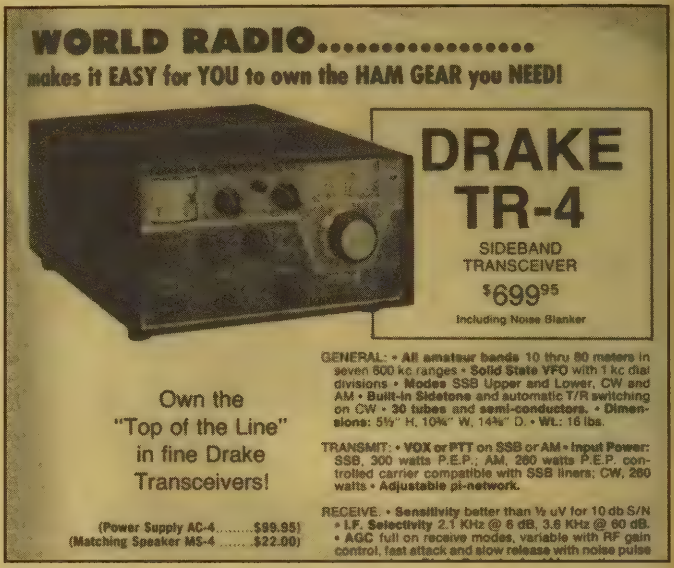
During the summer of 1973 an issue arose between the ARRL and the FCC. Who would propose the path ham radio would take in the future? The ARRL voiced the opinion that the FCC was harassing amateurs while letting the CBers run wild. In addition, the FCC proposed additional CB operation on 224 MHz! The tension finally abated when the FCC adopted a less provocative approach to amateur matters. But in 1974, the Commission proposed another plan to restructure amateur licensing, this time suggesting a "Communicator" class VHF license without a Morse Code requirement. The resulting firestorm was almost as great as the one over incentive licensing, and the proposal marked the beginning of a decade of amateur deregulation.

Two New *CQ* Columns

In November *CQ* started popular QRP and Novice columns, conducted by K8EEG and W9EGQ, respectively (actually, the Novice column was returning after a seven year hiatus; it continues today as "Bill's Basics," by W6DDB), and the December issue featured the new Atlas 180, a compact, solid-state HF transceiver that would be a popular item in the coming years.

Along other lines, the Kenwood TS-520 and Yaesu FT-101B looked very much like today's transceivers. Handhelds for 2 meters had dropped in price below $200 for six-channel, crystal-controlled units.

In October 1974 the Heath Co. dazzled hams with a full-color ad featuring the new SB-104 solid-state, digital-readout transceiver. It boasted 31 ICs, 75 transistors, and 171 diodes. The output stage was broadbanded—no amplifier tuning required!



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SIDEBAND TRANSCEIVER
699^{95}
Including Noise Blanker

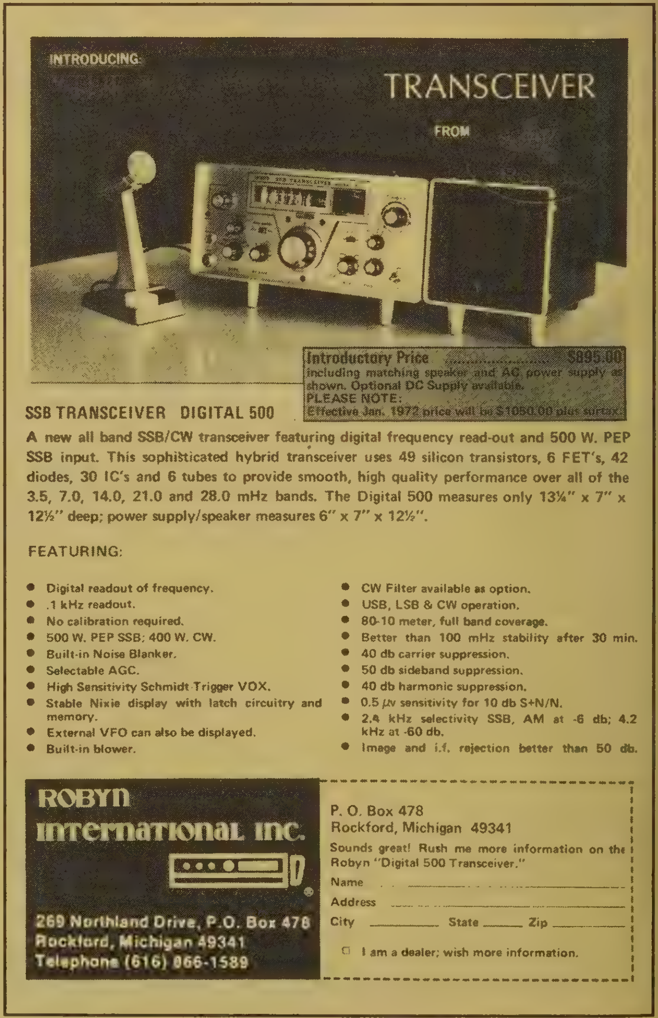
Own the "Top of the Line" in fine Drake Transceivers!

(Power Supply AC-4.........$99.95)
(Matching Speaker MS-4 ....$22.00)

GENERAL: • **All amateur bands** 10 thru 80 **meters** in seven 600 kc ranges • **Solid State VFO** with 1 kc dial divisions • **Modes** SSB Upper and Lower, CW and AM • **Built-in Sidetone** and automatic T/R switching on CW • **30 tubes** and **semi-conductors.** • **Dimensions:** 5½" H. 10¾" W. 14⅝" D. • **Wt.:** 16 lbs.

TRANSMIT: • **VOX or PTT** on SSB or AM • **Input Power:** SSB, 300 watts P.E.P.; AM, 260 watts P.E.P. controlled carrier compatible with SSB liners; CW, 260 watts • **Adjustable pi-network.**

RECEIVE. • **Sensitivity** better than ½ uV for 10 db S/N • **I.F. Selectivity** 2.1 KHz @ 6 dB, 3.6 KHz @ 60 dB. • **AGC** full on receive modes, variable with RF gain control, fast attack and slow release with noise pulse



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Introductory Price $895.00
including matching speaker and AC power supply as shown. Optional DC Supply available.
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SSB TRANSCEIVER DIGITAL 500

A new all band SSB/CW transceiver featuring digital frequency read-out and 500 W. PEP SSB input. This sophisticated hybrid transceiver uses 49 silicon transistors, 6 FET's, 42 diodes, 30 IC's and 6 tubes to provide smooth, high quality performance over all of the 3.5, 7.0, 14.0, 21.0 and 28.0 mHz bands. The Digital 500 measures only 13¼" x 7" x 12½" deep; power supply/speaker measures 6" x 7" x 12½".

FEATURING:

- Digital readout of frequency.
- .1 kHz readout.
- No calibration required.
- 500 W. PEP SSB; 400 W. CW.
- Built-in Noise Blanker.
- Selectable AGC.
- High Sensitivity Schmidt Trigger VOX.
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- CW Filter available as option.
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- 80-10 meter, full band coverage.
- Better than 100 mHz stability after 30 min.
- 40 db carrier suppression.
- 50 db sideband suppression.
- 40 db harmonic suppression.
- 0.5 μv sensitivity for 10 db S+N/N.
- 2.4 kHz selectivity SSB, AM at -6 db; 4.2 kHz at -60 db.
- Image and i.f. rejection better than 50 db.

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12 channels (4 with crystals)
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Compact — 8"h x 3" w x 1½ d
Full line of optional accessories includes external speaker-mike — desktop charger — "stubby" antenna — and more!
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SEND QSL FOR COMPLETE SPECIFICATIONS.

Test equipment for hams was approaching state of the art: The experimenter could buy a 60 MHz counter (with converter up to 160 MHz). *CQ* ran an article by K4KJ on the General Radio 916 RF bridge, followed shortly by a Hewlett-Packard ad for the HP-5382 counter, good up to 225 MHz. But little-noticed by most hams was the announcement that Collins Radio Co. had been sold to Rockwell International. The combined organization would continue producing ham gear, but there was an uneasy feeling that the world of ham radio was quickly changing, and not for the better for US manufacturers.

In early 1974 *Ham Radio* magazine started the *HR Report,* a twice-monthly newsletter about happenings of general interest to all radio amateurs. This was the first of several newsletters that would leave amateurs more knowledgeable about what was going on in their world.

Also accomplished in 1974 was the licensing of VHF repeaters with WR calls (later to be dropped), and the start-up of an obscure manufacturer in Mississippi called MFJ. Few thought at the time that MFJ would grow. It would likely fade into oblivion, as had so many other garage-shop operations. Anyway, it couldn't compete with the Japanese manufacturers. Or could it?

DXers were happy with the WA7IXE Palmyra DXpedition, as well as bemused with the story of the Kingman Reef trip, which hit newspaper headlines when the expedition was lost for two days and later caught in a tropical storm. You didn't have to be crazy to be on a DXpedition, but it helped!

CQ
10th Anniversary of the Launch of Oscar 1
The Radio Amateur's Journal

The August issue of *Ham Radio* reprinted a TRW engineering bulletin featuring solid-state, wideband amplifiers which covered 1.5 to 30 MHz. Two combined amplifiers provided 1 kW PEP for SSB service. This concept opened the door for the next generation of HF transceivers and power amplifiers.

RTTY enthusiasts appreciated the HAL line of products, advertised for several years in *CQ* and *QST.* An interesting adapter box provided interface to a TV receiver for visual readout—quite an advance from a Model 15 teletypewriter!

Finally, in the fall of 1974 AMSAT announced the launch of OSCAR 7, a translator satellite working on 10 meters, 2 meters, and 432 MHz—a huge step for the amateur satellite program. What would 1975 bring? ■

EIMAC provides reliability year after year–and now offers a 3,000 hour warranty.

For years, the industry-wide standard warranty for power grid tubes has been 1,000 hours.

For years, the operating lifetimes of EIMAC tubes have exceeded this warranty — reducing down-time and boosting on-the-air time in thousands of transmitters. So, EIMAC offers a new warranty policy for 81% of all standard power grid tubes: 3,000 hours/1 year, with prorated adjustment from 300 to 3,000 hours. Failure during the first 300 hours results in complete replacement.

This warranty is a direct result of reliability that has been built into every EIMAC product for the past 40 years. Our 3,000 hour warranty stands as proof.

For details about which tube types are covered by the new warranty, contact EIMAC Division of Varian, 301 Industrial Way, San Carlos, California 94070. Or any of the more than 30 Varian/EIMAC Electron Device Group Sales Offices throughout the world.

Eimac
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1975–1984: The Computer Moves In

This was the decade of the personal computer—in our offices, our homes and our ham shacks. It was the decade of packet radio and of FCC deregulation; of the hostages in Iran and of Reaganomics. For *CQ*, it was the decade of independence, as K2MGA (then Associate Publisher) and K2EEK (then, and now, Editor), bought the magazine from its founding publishers. Joe Lynch, N6CL, takes over our reporting of ham history in this decade, with a year-by-year approach to help us keep track of the rapid changes within our hobby.

Ham Radio History

1975-1984: A Decade of Deregulation

By Joe Lynch, N6CL

The year 1975 began a decade of great change for amateur radio, including changes in licensing, operating privileges and much more. As the decade started, the buzz word was "restructuring." Amateur radio growth had slowed to a halt, primarily because of the exponential growth of CB. Both the ARRL and the FCC were "looking over their shoulders" at what was happening. As a result, the FCC in 1974 proposed a restructuring of amateur licensing that flirted with a "no code" license.

The ARRL responded in 1975 with its own plan, including a new license class called the "Basic Amateur," which would require " . . . a familiarity with Morse code characters" and have a 50 watt power limit instead of the 250 watts the FCC envisioned for its proposed "Communicator Class" license.

When the FCC issued its report and order the following year, it left the license classes as they were, but gave Novices and Technicians extensive new privileges. Novices received an increase in power on the HF bands, from 75 watts to 250 watts. But all hams operating on the Novice bands would be limited to 250 watts.

Technicians were given all Novice privileges. And the limited system of giving exams by mail to people who lived far from an FCC test site was abolished.

In February 1975 a ham in Chicago called the police by dialing "911" on the repeater autopatch. This was the first known instance of the use of a repeater and the "911" emergency number by a ham to call for assistance.

In September hams participated in disaster communications following Hurricane Eloise, which hit Florida and Alabama after slicing through the eastern tip of Mexico's Yucatan peninsula.

For 1976 the FCC authorized hams a one-time privilege of using a special prefix in honor of the nation's bicentennial. For example, hams with the call prefix of "WA" could use the "AA" prefix; hams with the call prefix of "K" could use the "AD" prefix, etc. The first station to use the special prefix was AB6TR, a special event station at the Tournament of Roses parade in California.

1976

The year 1976 led off with a new size for most of the amateur radio magazines. Citing increasing costs of paper, the League led the way with an announcement in mid-1975 that it was going to make the shift to the larger 8½" × 11" size.

Joe's Journal

January 1985

I was going to start this look back at the decade just ended by announcing with relief that once again we managed not to blow ourselves up, and that we even managed to go ten years without getting American boys involved in a major war. But I'm not going to do that. Historians of the future will remember this decade for something different, and that's how I'm going to start my look back at 1975 to 1984. So here we go.

Every once in a while, there is a single development that ranks up there with fire and the wheel—something that fundamentally changes the way people live, work or travel. Television was the last one. And before that, you have to go back to the turn of the century and the incredible changes brought about by the electric light, the telephone, radio, the automobile and the airplane. The past decade has seen one of those fundamental changes, one which (while it may not seem that way now) may someday rival the invention of the printing press as a means of putting knowledge and information into the hands of the common man. I'm talking about the personal computer.

The power of the computer came of age in the '60s and early '70s. But until just ten years ago computers were huge machines, monstrously expensive and affordable only by universities, big businesses and the largest government agencies. They had their own climate-controlled rooms and a staff of programmers and technicians to keep them running. Today I have a computer on my desk, and I don't have a support staff to run it or write programs for it. I'm writing this journal entry with a word-processing program I bought at the store and installed myself. Plus, the computer can use the telephone to call other computers and exchange information with them. And this is only the beginning.

Ten years ago I scoffed at a 1965 prediction by *Time* magazine that soon "Data transmission will bring the skills of giant computers to anyone who needs them (and) the computers themselves will join forces in a vast network." Well, it might have been science fiction in 1975, but it's very much science fact today. University researchers and the defense department all talk to each other and exchange files via computer; and even I, with my little desktop computer, can hook into the big computer at CompuServe in Ohio (and I don't have to call Ohio, either), exchange messages with other users and access a wide variety of information and other resources.

Dick Ross, K2MGA, at the Editor's Desk, late 1975 (nice shirt, boss!)

The magazines got bigger, but the print size, for the most part, stayed the same.

Regulations were changing rapidly. The FCC gave Extra class hams a one-time opportunity to choose an available 1 × 2 callsign; removed the requirement for signing "mobile" or "portable" and the need to notify the FCC in advance of trips more than 15 days away from one's home QTH; eliminated the requirement of operating time for renewal of one's license; eliminated the one year experience requirement for upgrading to Extra class and eased restrictions on remote-control operations. →

(There's another new communications tool in my office that's changing the way we do our work. It's not a computer, but a "fax" machine. News services have been sending photos by wire for years, but a new fax standard developed in 1980 has led to the increasing popularity of these machines for sending facsimiles of business documents.)

There's one aspect of the computer revolution about which the pundits continue to be wrong, at least so far. Their visions of the computer-age home generally perceived one central computer that turned lights on and off, controlled the temperature, cooked the meals and ran the dishwasher (one prediction even foresaw automated lawnmowers that would sense when the grass was too tall and just go cut it).

Instead, what we're seeing is lots of little computers, each performing specialized tasks. For example, in 1976 General Motors put the first microcomputer in a car. It measures fuel level and consumption, speed, battery voltage and oil pressure, calculates trip times and generally runs the engine. Also in 1976 Canon introduced its AE-1, the first camera that uses a microprocessor to control exposure settings.

Our banks are all computerized, too, of course. And one side benefit of that is that we're no longer tied down by "bankers' hours." Some banks have had cash dispensing→

CQ's "Guiding Lights"

CQ Editors and Publishers, 1975–1984

Dick Ross, K2MGA: Editor, July 1964 – Dec. 1975; Associate Publisher, Jan. 1976 – Dec. 1979; Publisher, Dec. 1979 – Present

Alan Dorhoffer, K2EEK: Editor, Apr. 1976 – Present

Richard Cowan, WA2LRO: Publisher, 1958 – 1979

"WANTED: Assistant editor for ham radio magazine. Must be active ham; no journalism experience desired." That, in a nutshell, is how *CQ* Editor Alan Dorhoffer, K2EEK, describes the ideal candidate for a *CQ* assistant when he joined the staff back in 1960. His qualifications matched perfectly.

"In that sense, it was a wonderful learning experience," Dorhoffer recalls. "You did everything. It was all linotype—'hot type.' It was a different age, the non-digital age, the analog age of publishing."

There was one other requirement for any prospective employee at the time: "Dick Cowan was titular head of the organization, but we still had to pass muster with his father. Meeting 'Mr. Cowan' meant having dinner with him and his wife at 'the Great Neck home.' Alan says he survived that initiation unscathed, only to be fired a few months later after a disagreement with then-editor Arne Trossman, W2DTJ. After Trossman left *CQ* in 1964, Alan returned as Assistant Editor.

Over the next 12 years Dorhoffer's title on the masthead grew more impressive as he rose from Assistant Editor to Associate Editor, then Managing Editor. But, he points out today, "It was all the same job. I got titles in lieu of raises."

In the early '70s, though, says Dorhoffer, "Dick branched out and got more involved in the business end of publishing, and I got more involved with the editorial end. At the end of 1975 we made the transition to a large-size format, and with that change I became editor. I've now held the title of editor longer than anyone. That's a lot of editorials!" *(And a lot of hamfest food!—NW2L)*

The biggest change in *CQ*'s fourth decade was its sale by Cowan Publishing Co. to the newly-formed CQ Publishing, Inc., owned by Dick Ross and Alan Dorhoffer. Ross explains how the sale came about:

"The publication was not in really strong shape in 1979. Cowan was publishing seven magazines at the time; I was running the whole operation for them, as General Manager and Controller of the whole company. As often happens in a small company, the most attention was focused on the most successful product—which didn't happen to be *CQ*. Thus, it got a bare minimum of attention and money."

"The company was starting to hurt for cash in the wake of the end of the CB boom (its *S/9* CB magazine had been the money-maker that *CQ* wasn't), and the family started talking about either selling or folding *CQ*. I read the handwriting on the wall and began discussions with Dick Cowan on what it would take to acquire *CQ*. As it happened, both Alan and I had money available from the sale of our parents' houses, and my father loaned me some more of the downpayment. On paper it looked like we should have been millionaires inside of three years. It's been 15 years now and we're still waiting. On the other hand, we paid off the purchase in ten years, and never missed a payment."

Alan Dorhoffer, K2EEK, soon after becoming CQ *Editor in 1976*

Ham Radio History *cont.*

Senator Barry Goldwater, K7UGA, introduced legislation that would place the responsibility for RFI onto the manufacturers of consumer electronics equipment. Because of heavy opposition this legislation languished in committee by year's end.

In DXCC circles, the "island" of Okino Tori-shima was granted "country" status by the ARRL. Later known as "Baldwin's Reef" because of the staunch support for its country status by then-ARRL General Manager Dick Baldwin, W1RU, this spot of land was barely above water on some low tides. Those inside the League at the time stated that the "country" status was granted to curry political favor with the Japanese. By 1980 this "country" was deleted from the DXCC "active country" list.

Hidetsugo Yagi—who, along with his assistants Uda and Okabe, was responsible for designing the antenna bearing his name—passed away in January at the age of 89. To this day the word "Yagi" is synonymous with multi-element beam antennas.

On the VHF and above bands Al Katz, K2UYH, completed the first WAC (Worked All Continents) on 432 MHz, and Dick Hart, K0MQS, became the first to work all states on 2 meters.

Amateurs participated in disaster communications following the February Guatemalan earthquake and devastating Typhoon Pamela, which hit Guam in May.

1977

In 1977, following a federal court decision overturning some of the FCC's fee structures, the Commission suspended collection of all amateur radio license fees.

Herb Brier, W9AD (and previously W9EGQ), long-time *CQ* Novice column editor, became a Silent Key. Herb had been bedridden because of rheumatoid arthritis from the age of twelve. Because of his physical limitations, he was not able to go to school past seventh grade. Nevertheless, he taught himself advanced math, Spanish, and Braille (for a friend). His last column appeared in August.

The James Millen Company, which had been a part of amateur radio development since 1927, went out of business after its factory was taken over by the local redevelopment authority.

In some respects it was indicative of the changing times. Another sign was the positioning of advertisers within magazines. For many years Heathkit enjoyed the premium position on *CQ*'s inside front cover. By January Heath had been displaced by Kenwood. And by mid-year Kenwood had grabbed the outside back cover of *QST* from Eimac, the tube manufacturer. Yaesu was already well-established on *QST*'s inside back cover.

While some were on their way out, some were on their way

The Personal Computer

Computers today are an integral part of many ham shacks and virtually all businesses. The "information superhighway" puts vast research libraries at our fingertips. PCs have changed the way we work, write and communicate, and they've done it in a scant 20 years.

The story of the personal computer goes back to the early days of UNIVAC and EDVAC, to the invention of the transistor, the integrated circuit and the microprocessor. But it wasn't until 1975 that it all started to come together. The year 1975 was a big one for the electronics world. Fifty million pocket calculators were sold that year; the $50 electronic watch came on the market; Atari and Sears introduced the first home video game, "Hocky Pong," in time for Christmas. And the Altair 8800 appeared on the market. It was the first commercially-available personal computer. It wasn't for the faint-hearted, though. You had to build it from a kit, and it had only 256 bytes of memory. But it was there. Just a year later two Californians named Steve Wozniak and Steve Jobs built a computer in Wozniak's garage. They wanted it to sound friendly, so they called it the "Apple."

When they introduced the Apple II in 1977—the first personal computer you could unpack from the box, plug in and start
using—the revolution had arrived. A year later they added t
first disk drive for a personal computer; and the year after th
Visicalc introduced the first spreadsheet program for a persc
al computer, opening the power of computers to non-pı
grammers. The computer was now a tool that anyone could u
But would it catch on?

The future of the personal computer was assured in 198
when the biggest name in the computer industry threw its hat
the ring. IBM's "PC" ran on a disk operating system from a co
pany called Microsoft, and suddenly the desktop computer w
big business. It took only a year for the copycats to scram
aboard, as Compaq brought out the first PC "clone," which us
the same operating system and other common elements. IE
upped the ante in '83 with its PC-XT, which included a "ha
disk" with 10 million bytes of storage! It was mid-boggling at t
time—the equivalent of 27 double-sided floppy disks, all av
able in an instant!

Of course, Apple didn't roll over and play dead when IBM
into the game. But the folks there went off in a different dir
tion, and in 1983 unveiled "Lisa," which was the first perso
computer that didn't rely completely on the keyboard and typ
commands. A "Lisa" user had a pointing device called a "mous
which moved the cursor to a specific spot on the screen,
popped down a menu from which you made choices. It w

CQ's Columns—At The Heart Of It All

Monthly columns are a magazine's lifeblood—the regular features by experts that readers look forward to month after month. *CQ* has always had the good fortune to attract the very best columnists in amateur radio, and sometimes in all of radio. This is a tradition passed on from its predecessor, *Radio* (along with several of *Radio's* columnists).

CQ's columns have come and gone, and sometimes returned, reflecting the changing interests of a dynamic hobby. But *CQ*'s columns and columnists have always done much more than mirror the interests of our readers. They have helped lead our readers—and our hobby—in new directions.

"Through the years, *CQ* has been the first magazine to cover, on a regular basis, slow-scan TV, coherent CW (a forerunner of today's digital communications), OSCAR satellites, packet radio," says Editor Alan Dorhoffer, K2EEK. "At every point where there was a new mode emerging, we always made it a point to cover it, with a column whenever possible. That predates me. We were the first magazine to support SSB when it emerged with a column and an award system to encourage its use."

In addition, the first regular propagation predictions in any ham magazine appeared in *CQ* starting in 1946. *CQ* had the first column devoted to mobile operating (1949), the first Novice column (1951), the first RTTY column (1951) and the first semiconductor column (1957). It was in the semiconductor column that Don Stoner, W6TNS, first proposed putting a ham radio satellite in orbit. And when it was clear that enterprising amateurs would soon meet that challenge, *CQ* became the first magazine with a column devoted to "Space Communications." (Many of these trail-blazing activities are discussed in greater detail in other articles here in our special anniversary section.)

But a column is only as good as its columnist. "We have been very fortunate always to have top people as columnists, award directors and contest managers," notes Dorhoffer. "If you look through the mastheads, we've always had the best collection of columnists of any ham magazine, ever."

"We have the best writers ever assembled by any ham radio magazine, including *Radio*," Dorhoffer continued. "*Radio* had the giants of their time, but not in the numbers that we've had. You try to recognize people who have talent whom you can encourage and cultivate. Many people come to us with established track records. But occasionally, you come across someone at the beginning . . . and with any luck, they remember who helped them start."

—NW2L

in. Phil Anderson, W0XI, owner of Kantronics, and Martin F. Jue, K5FLU, owner of MFJ, ran their companies' first ads in amateur radio publications.

The year also featured a new ham magazine, from the editors of *Ham Radio*, called *Ham Radio Horizons*. It was aimed at new Novices and Technicians. The magazine didn't last, however, and it was incorporated into *Ham Radio* magazine in 1981.

In the continued spirit of restructuring, the FCC authorized "instant upgrading" in 1977. In this version, the licensee was issued a permit at the FCC testing office that was good for 90 days or until the permanent license arrived. Also, the licensee had to sign a distinctive suffix related to the FCC district office where he or she took the exam.

The FCC also began a major revamp of call sign assignments. It imposed a moratorium on the issuance of special-event call signs, new club calls and secondary call signs (the moratorium was made permanent in 1978); dropped the requirement to change calls when moving into a new call district; stopped issuing distinctive calls for Novices; and

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impressive but awfully expensive, and sales weren't what Apple had hoped.

In an effort to recover more of its investment in the Lisa technology, Apple used it as the basis of a lower-priced, 1984 introduction, which it called the Macintosh. The "Mac" was an immediate success, although still high-priced when compared to IBM clones. It has been the mainstay of Apple's business for the past ten years.

While IBM and Apple fought over the high end of the personal computer market, prices for the most basic computers were dropping like stones. In August 1982 *Popular Science* featured on its cover the "World's First $100 Computer," the Timex-Sinclair TS-1000. It had a membrane keyboard, no monitor (you used a TV set), 2K of RAM and storage on an optional audio cassette. It was an introduction to computers for thousands of people (including this writer). The T/S-1000 was followed by Coleco's "Adam" and the Atari 600-XL, both of which featured real keyboards and real printers (the T/S-1000 offered a tiny thermal printer), and then by the ubiquitous Commodore 64, which still sits in many ham shacks today. Within a decade of their introduction, personal computers had become widely available and widely affordable. And they were here to stay.

—NW2L

Joe's Journal *cont.*

machines since the late 1960s, but more and more they're being replaced by Automatic Teller Machines, or ATMs, which can accept deposits and transfer money between accounts, as well as giving you some extra cash. "Tillie the All-Time Teller" made her debut in Atlanta in 1975, and the first drive-up ATM appeared in 1980 in Baton Rouge, Louisiana.

Enough about computers. What else has happened in the past ten years? Well, as I mentioned earlier, we haven't blown ourselves up and we've managed to keep U.S. troops out of any more major wars (the first decade in a half-century for which we can make that claim). We've even taken a big step toward peace in the war-torn Middle East.

In 1977 Egyptian President Anwar Sadat, spurred on by TV news anchor Walter Cronkite, made the first-ever visit by an Arab leader to Israel. The following year President Jimmy Carter (who, by the way, defeated Gerald Ford in 1976, then was himself defeated by Ronald Reagan in 1980) brought Sadat and Israeli Prime Minister Menachem Begin together at Camp David, Maryland. For thirteen days he acted as a courier between the two, and finally emerged with a "framework for peace" in the Middle East. In 1979 Carter spent

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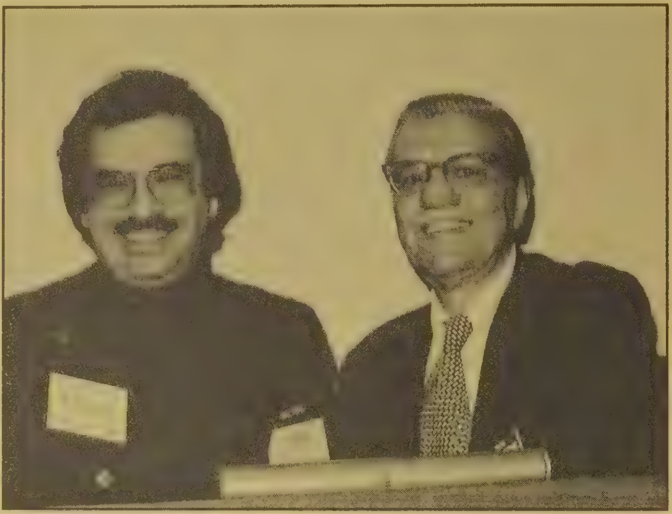
Ham Radio History *cont.*

stopped changing calls of these licensees when they upgraded. This meant that WN4XXX would not automatically become WB4XXX on upgrading. By 1978 a whole new scheme for issuing call signs was put into effect, offering shorter calls as a reward for upgrading. This is the system that is in use today.

The call sign changes happened for two reasons: (1) the FCC was installing a computerized system for issuing licenses, and the system couldn't handle special call signs or out-of-sequence changes; and (2) there were too many abuses of the special call sign system.



CQ Contest Editor Frank Anzalone, W1WY (SK), with CQ Worldwide DX Contest Director Fred Capossela, K6SSS, at the 1975 Dayton Hamvention.

What had seemed to be a novelty, that of having distinctive call signs, had gotten out of hand. Some hams had as many as eight secondary calls. Some hams were creating pseudo clubs in order to obtain so-called deceased members' calls. And some Extras were creating secondary addresses in DX locations in order to obtain a two-letter call that they could turn in for a domestic two-letter call, thereby jumping up the ladder of priority.

However, the most shameful aspect of call sign assignment was within the FCC itself. In 1977 Richard Zeigler, then the chief of the Commission's Special Licensing Section at Gettysburg, was convicted of receiving payments for preferential call sign assignments. Zeigler's testimony and internal investigations revealed a pattern of issuing specific call signs at the request of senior FCC officials to "friends of amateur radio," or to friends of FCC commissioners.

Meanwhile, the FCC was becoming a victim of its own success. Amateur license restructuring brought in over 21,000 ham radio applications in January 1977 alone. At the same time, Gettysburg processed nearly one million CB applications. The workload had increased 1000 percent.

With the headache that had been created by the CB service getting out of hand came illegal activity. The FCC was overtaxed in enforcement of illegal activity both on CB and on frequencies between 11 and 10 meters. Known as 10-1/2 meters, this "no man's land" was filled with operators who were using modified amateur radio equipment, including linear amplifiers, to "work the world."

As a result of this illegal use of linears (which was by no means limited to 10½ meters), the FCC banned the sale of any linear capable of transmitting on frequencies between 24 and 35 MHz and put all other linear amplifiers and commercially manufactured transmitters under its type acceptance program. The new rules were enacted despite strong opposition from the ARRL and the amateur radio industry.

Joe's Journal *cont.*

another six days as a courier, shuttling between Cairo and Jerusalem, and emerged this time with formal peace treaties ending the 30-year state of war between Egypt and Israel. Begin and Sadat shared the 1978 Nobel Peace Prize.

Not all has been peaceful in the Middle East, though. Civil war continues to tear apart the tiny nation of Lebanon. Fighting broke out again in 1975, Syria intervened in '76, and in 1978 Israel invaded briefly to stop terrorist attacks from across the border. Israel pulled out after U.N. peacekeepers moved in, but returned in force in 1982, occupying Beirut and forcing the Palestine Liberation Organization to move its headquarters out of Lebanon.

After the Israelis left Beirut, civil war broke out again. This time U.S. Marines were sent to secure the Beirut airport as part of a multinational peacekeeping force. There wasn't much peace to keep, and in October 1983 a terrorist drove a car loaded with explosives right into the Marine barracks. Two-hundred thirty-seven Marines were killed in the blast, and the rest came home a few months later.

In 1979 a coalition of rebellious students and Islamic fundamentalists overthrew the U.S.-backed Shah of Iran and declared an Islamic republic. Later that year militant Iranians seized the U.S. embassy in Tehran and held Americans hostage there. It quickly became apparent that the occupiers were acting with the blessing of Iran's government. Carter didn't seem able to negotiate the hostages' release, and an attempted rescue mission never got off the ground amid confusion and a plane crash that cost eight American lives. Carter was perceived as being ineffectual and lost his re-election bid in 1980 by eight million votes. The Middle East, which provided Jimmy Carter with his crowning achievement as President, had also cost him re-election. As soon as Ronald Reagan took office, Iran announced it was releasing the 52 Americans held hostage there for 444 days.

During all of this Iran went to war in 1979 with its neighbor, Iraq, in a dispute over territory. They're still fighting. One of Iran's other neighbors, Afghanistan, is not a peaceful place either. In late 1979 Soviet troops invaded to put down a revolt against the pro-Moscow government there. The U.S. reacted with economic sanctions against the Soviets and by leading a boycott of the 1980 Summer Olympics in Moscow (the East Bloc retaliated by boycotting the '84 summer games in Los Angeles). Five years later the Soviet Army is still bogged down in Afghanistan, which is beginning to look like the Soviets' Vietnam.

There has also been a significant challenge to

Senator Barry Goldwater re-introduced his RFI bill in 1977. Again the bill met with much opposition. Nevertheless, the FCC started to take an interest in the problem by exploring its options through federal preemption. By the end of 1978 the FCC had issued a Notice of Inquiry, General Docket 78-369, looking into what it could do to regulate the susceptibility of consumer electronics equipment to RF radiation.

During 1977 hams provided emergency communications for the Beverly Hills Supper Club fire in Southgate, Kentucky and the Johnstown, Pennsylvania floods.

1978

With the rising sunspots came a rise in growth in amateur radio. The year 1978 saw a tremendous growth in the Novice class license. Ham radio activity was also up.

Among the changes affecting hams in 1978 was a relaxation of repeater regulations. Gone were the distinctive "WR" calls, and any licensee, Technician class or above, could now be a repeater control operator. Plus, Technicians were granted full privileges on any amateur frequency above 50 MHz. And the Novice license, for the first time, was made renewable.

In March the OSCAR 8 satellite was successfully launched. And DXers were entertained by a DXpedition to Clipperton. Operating on all HF bands, this group worked in excess of 35,000 stations.

Another foreign manufacturer's ads started appearing regularly in 1978. ICOM, advertising its IC-701, took out well-positioned full-page color ads.

Computers were also starting to make inroads into the shack. In a *QST* article entitled "His Computer Does the Operating," Chod Harris, WB2CHO (a.k.a. VP2ML), wrote about Randy Smith, VE3SAT, and how he designed his station to be operated entirely by a computer. Some other ham/computer enthusiasts in Canada got government per-

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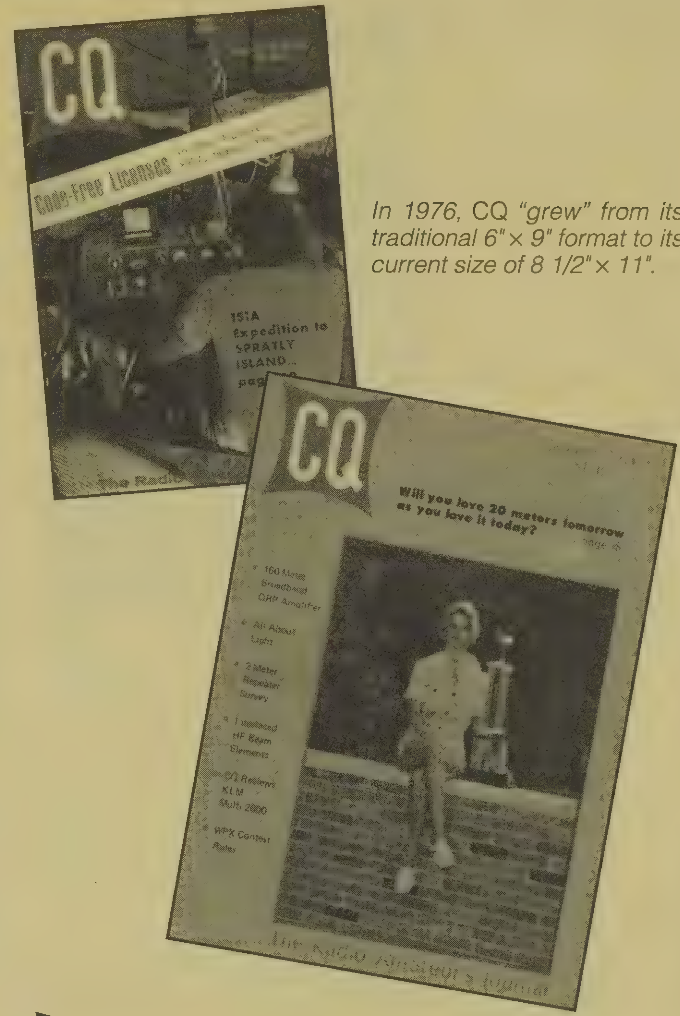
CQ
Code-Free Licenses
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The Radio
CQ
Will you love 20 meters tomorrow as you love it today?
160 Meter Broadband QRP Amplifier
All About Light
2 Meter Repeater Survey
Inclined HF Beam Elements
CQ Reviews KLM Multi 2000
WPX Contest Rules
The Radio Amateur's Journal

In 1976, CQ "grew" from its traditional 6" × 9" format to its current size of 8 1/2" × 11".

Communism in Eastern Europe. In 1980 an independent labor union calling itself Solidarity appeared in Poland, leading a strike by shipyard workers in Gdansk. Its leader is a man named Lech Walesa. For the first time in a Communist country since World War II, the Polish government did not respond with force. And after two months of crippling strikes, it granted legal status to Solidarity. In 1981, however, the labor union demanded more and more from the government—including the right to challenge it in elections. That was too much for Poland's leaders, who, fearing Soviet intervention, declared martial law and banned Solidarity. Many of its leaders were imprisoned, and the rest went underground. But I don't think we've heard the last of Solidarity, largely because of the new Pope, John Paul II.

Pope Paul VI died in 1978, and his successor, Pope John Paul I, died just 34 days after his election. His successor was the first non-Italian pope in over 400 years—Polish Cardinal Karol Wojtyla. As Pope John Paul II, he has been an outspoken opponent of Communism and particularly the atheism that is part of its basic philosophy. He has also traveled widely and been the Catholic Church's most active and visible leader in decades.

Visibility is not without its risks, though. Pope John Paul was wounded in an assassination attempt in 1981, soon after President Reagan was shot and wounded in an attempt on *his* life. Back in 1975 there were two assassination attempts against President Ford—both by women. The Beatles' John Lennon was shot and killed in 1980; Egypt's President Sadat was assassinated in 1981, and Indian Prime Minister Indira Gandhi was killed last year by her own bodyguards. (She was succeeded by her son, Rajiv Gandhi, who also happens to be VU2RG; he joins Spain's King Juan Carlos, EA0JC, and Jordan's King Hussein, JY1, in the ranks of world leaders who are hams.)

Other notable changes in world leaders in the past decade include the Soviet Union, where Leonid Brezhnev died (of natural causes) in 1982. KGB Boss Yuri Andropov was chosen to succeed him, but he died just last year, and Konstantin Chernenko is the man in charge now. They are all from the same generation, though, and a rising star to watch in Moscow is the much younger Mikhail Gorbachev, whom Andropov brought into the ruling Politburo as Minister of Agriculture.

In China Mao Zedong (who used to be Mao Tse Tung before the U.S. recognized Communist China and adopted Peking's version of English spellings for Chinese words) died in 1976. The apparent power in Beijing (see above) today is Vice Premier Deng Xiaoping. He visited the U.S. and met with President Carter in 1979. Spanish dictator Francisco Franco died in 1975 after which the monarchy was restored

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Ham Radio History *cont.*

mission to put their computers on the air using something called "packet radio."

In September Larry LeKashman, W2AB (ex-W2IOP), became a Silent Key. Larry was the guiding force who got *CQ* off the ground in its earliest days, serving as Assistant Editor, managing Editor and Editor between 1946 and 1949. He went on to leadership positions at RCA, Lafayette, Bogen and Electro-Voice, where he eventually became President.

Hams in 1978 provided emergency communications during flooding in south Texas and the blizzards that affected many areas of the northeast.

1979

By far the biggest news of 1979 was WARC-79, the World Administrative Radio Conference. This conference promised challenges and possible new privileges in the form of new ham bands. Both *CQ* and *QST* had extensive coverage of the preparations for the conference. (The ARRL and other ham organizations had actually begun preparations back in 1976.) The ARRL's Dick Baldwin, W1RU, is credited by many as the driving force behind amateur radio's great success there.

What U.S. hams received at WARC-79 were three new HF bands—30, 17, and 12 meters—to be phased in over the next decade, a shared UHF band (902-925 MHz) and several satellite bands on the microwave frequencies. The conference also opened the door for our current code-free Technician license by changing from 144 MHz to 30 MHz the frequency above which code was not required as a condition for licensing.

In March 1979 the FCC announced that it was going to take another look at the Communicator class license, which it originally introduced in its 1974 restructuring proposal. It was shelved at the time due to heavy opposition. By now, however, a Canadian digital ham license, which required no Morse code test, was a forgone conclusion. And the FCC thought hams might be ready to accept a code-free license. (They weren't.)

In July Mike Vestal, WØYZS, became the first ham to work all states on 432 MHz. And in October the Panamanian government took over the issuance of licenses in the Canal Zone.

As a TS 520 owner you go on the air with a sense of pride and confidence. Thousands of these precision built beauties are in operation all over the world . . . in ham shacks, field day sites in DX and contest stations and in countless mobile installations. No other rig has ever offered the performance dependability versatility and value that is built into every KENWOOD TS 520. It lets you go on the air almost anyplace with its built-in 110 220 VAC and 12 VDC power supply. The TS 520 employs two rugged time proven S 2001 (equivalent 6146A) final tubes which are known for long life and superb linearity. You have certainly heard the TS-520's clean signal on the air and have probably heard a lot of glowing praise by other hams. So if you don't already own a 520, maybe it's time that you did

Joe's Journal *cont.*

and Juan Carlos (EA1JC) took the throne. And in England, the British Parliament chose Margaret Thatcher in 1979 as that nation's first female prime minister.

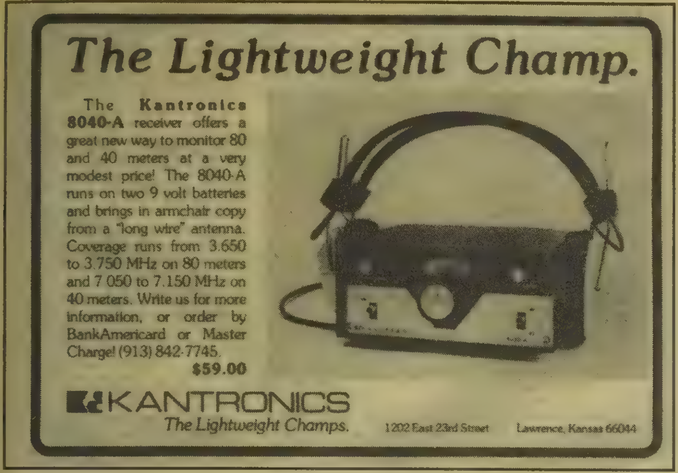
Here at home the biggest single story of the decade was our nation's bicentennial in 1976. There were celebrations everywhere, including a national bell-ringing ceremony on July 4, when bells across the country rang out at exactly the same time.

The final chapter of the Vietnam War was written in 1975, when victorious North Vietnamese troops entered Saigon. The few remaining Americans there fled by helicopter from the roof of the U.S. Embassy, abandoning and even shoving away Vietnamese embassy workers who had been loyal to them for years. Later thousands of refugees from Communist rule tried to escape Vietnam in rickety boats, but most nations (including the U.S.) refused to accept them, and many of these "boat people" died at sea. Jimmy Carter tried to close the book on the Vietnam era here at home by pardoning all Vietnam draft evaders on his second day as President. He made no friends among veterans by doing this.

The book was also closed on Watergate. In 1975 former chief White House aides H. R. Haldeman and John Ehrlichman, plus former U.S. Attorney General John Mitchell, were convicted of covering up White House involvement in the Watergate break-in. They each were sentenced to 30 months to 8 years in prison.

While the country was beginning to recover from the twin traumas of Vietnam and Watergate in 1975, the economy showed no signs of recovery. It remained mired in a deep recession, coupled with continued inflation, that had begun in the late '60s. President Ford campaigned to "Whip Inflation Now," but unemployment in 1975 was at its highest level since 1941, and industrial production suffered its steepest drop since 1937. New York City was saved from defaulting on its loan payments only by a last-minute bailout from Washington. But President Ford approved the aid reluctantly, and only after the New York *Daily News* published a headline that was to haunt him in the 1976 election: *"Ford to City: Drop Dead!"* The recession continued all the way through the Carter administration, prompting doubts overseas about the security of the U.S. dollar, massive increases in the price of gold and a stock market crash in 1979 that nearly rivaled the crash of '29.

Ronald Reagan took office as President in 1981, pushing



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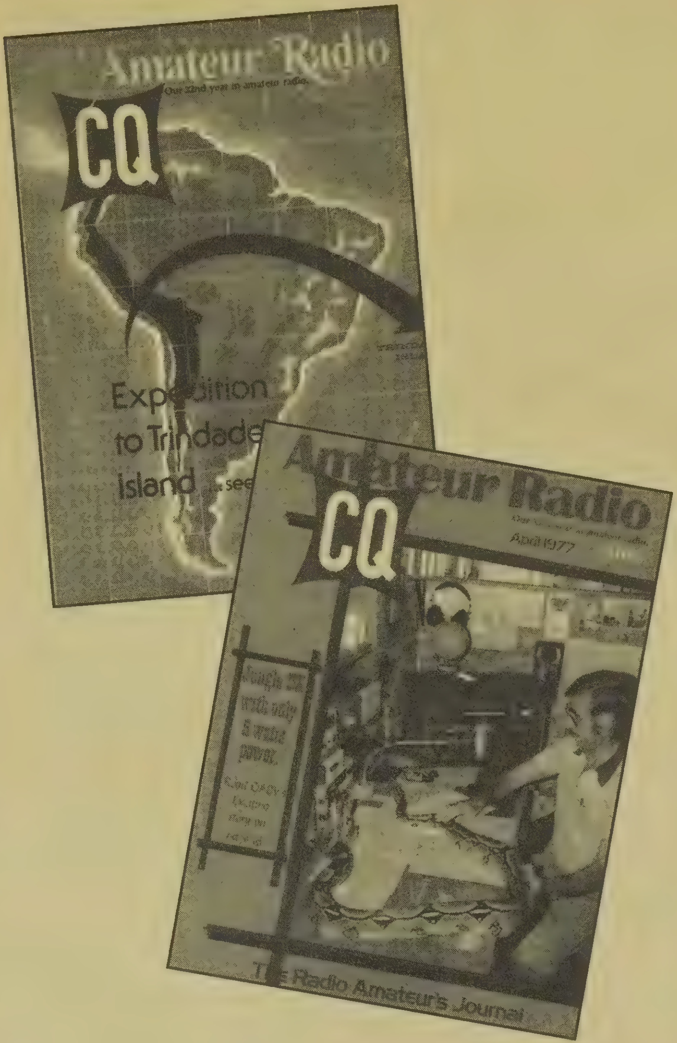

Amateur Radio
CQ
Our 22nd year in amateur radio
Expedition to Trindade Island ...see
Amateur Radio
CQ
April 1977
The Radio Amateur's Journal

The "KZ5" prefix, along with the "country" status of the Zone, was now history.

Throughout 1979 hams were bugged by a sound on several HF frequencies. Dubbed the "woodpecker" because of its racheting sound, the signal was tracked to Russian over-the-horizon radar. While the Russians formally denied responsibility, the signal finally went away with the changes in the Soviet Union's political situation a decade later.

Amateur radio operators in 1979 participated in emergency communications at the Three Mile Island nuclear power plant accident, following the terribly destructive tornado in Wichita Falls, Texas, and during hurricanes David and Frederic. Hams in Canada participated in emergency communications following the Mississauga (Toronto) train wreck.

At the end of the year a couple of ham journalists also became entrepreneurs. Dick Ross, K2MGA, and Al Dorhoffer, K2EEK, bought *CQ* magazine from the Cowan family, which had published *CQ* since its inception in 1945. Both →

a major economic reform package that he hoped would revitalize the economy. Dubbed "Reaganomics," the plan called for a combination of massive federal spending cuts, income tax cuts to spur investment and relaxation of business regulations. The economy finally began to turn around in 1983, as unemployment began to fall, production began to rise and the stock market turned bullish. Unlike previous recoveries, inflation remained low. But all of this has come at a cost of spiraling federal deficits, funded mostly by foreign investors. It's too early to gauge the long-term effects.

Civil rights, probably the major domestic issue of the previous two decades, faded from the headlines in the past ten years. Most of the legal battles had been won, and the work of creating truly equal opportunities went on quietly and slowly. There have even been some reverses from the perspective of civil rights leaders, such as the Baake case, a claim of reverse discrimination, in which the Supreme Court overturned blatant racial quotas in college admissions, but okayed programs that give an advantage to minorities. The big domestic battle of the decade just ended has been over the issue of abortion. The 1975 manslaughter conviction of a Boston doctor for performing the procedure set off a national debate pitting "right to life" advocates against "pro-choice" opponents. The debate continues to rage.

Women in general have both gained and lost in the past decade. The Equal Rights Amendment failed to be ratified within the time period allowed by law. In 1981, however, President Reagan named the first woman ever to the Supreme Court (Justice Sandra Day O'Connor); Sally Ride became the first American woman to fly in space in 1983 (nearly 20 years to the day after Valentina Tereshkova became the first woman of any nationality to do so), and in 1984 the Democratic Party chose Rep. Geraldine Ferraro as its candidate for Vice-President, the first woman nominated for national office by a major political party. Plus, more and more women are working outside the home. But for many it's less a matter of choice than of financial necessity.

A 1981 strike by federal air traffic controllers sparked the beginning of a downslide in the power of labor unions. When the striking controllers defied a White House back-to-work order, President Reagan fired them and hired non-union replacements. More and more, though, we're seeing unions and management starting to work together, and workers are being given more say in how companies operate. This new spirit of cooperation is born of necessity in the battle for survival against foreign competition. And some of the foreign competition is here at home! Japanese car makers, for example, are starting to build assembly plants here in →

Ham Radio History *cont.*

Dick and Al had worked for the Cowans over the years, and both had served as editor of *CQ*.

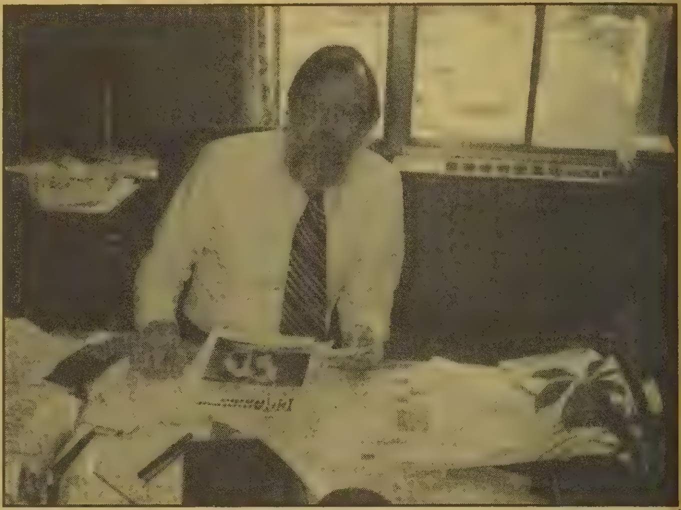
1980

The year 1980 contained sadness and a major setback. Two hams lost their lives when Mount St. Helens erupted on May 18. Jerry Martin, W6TQF, was at an outpost poised to give the warning when the eruption occurred; and Reid Blackburn, KA7AMF, was manning a control transmitter that was to be used to remotely control cameras taking pictures of the eruption. When the blast occurred, Jerry did give the warning. However, contact with him was lost a few minutes later when the blast overran and destroyed his location. His body has never been recovered. At the same time the blast sent a wall of ash, debris, and mud in Reid's direction, destroying everything in the area. Reid's body was recovered six days later.

Amateur satellite users were dealt a severe blow when Phase III (what was to be OSCAR 9) was dumped into the Atlantic Ocean upon the failure of one of the engines in the launch vehicle. Phase III was to incorporate the "Molniya" elliptical orbit for the satellite, thereby creating a larger and longer footprint for operating through it. With the setback, it wasn't until 1983 that OSCAR 10 (also a satellite with a Molniya orbit) was launched.

The year was not all sad, however. Color SSTV pictures were exchanged across the Atlantic. Nick Laub, W0CA, became the first amateur to work all continents via satellite. And spread-spectrum techniques were introduced.

The ARRL went to the movies in 1980 by participating with Dave Bell, W6AQ, in the production of the video, *The World of Amateur Radio,* which featured several celebrity hams.



New Publisher. Dick Ross, K2MGA, became CQ's Publisher in 1979, nearly two decades after joining the staff. This photo is from 1981.

The FCC legalized the use of ASCII (American Standard Code for Information Interchange) on the ham bands, based on the success of using ASCII in communicating with OSCAR satellites through a series of special temporary authorizations, or STAs. This opened the door for packet radio to move into amateur radio's mainstream. KA6M put the first U.S. digipeater on the air in the San Francisco area, and WB4JFI started the first packet bulletin board (PBBS) in Washington, DC. Amateur radio's next technical revolution was under way (although it didn't really kick into high gear until the AX.25 packet protocol was adopted in 1982).

Toward the end of the year the League revived its RFI ad hoc committee to try to determine solutions to the growing problem of RFI, and reported its findings to the FCC.

Malicious interference also continued to increase. In

Joe's Journal *cont.*

the U.S., staffed by American workers.

The medical breakthroughs of the '50s and '60s have slowed down somewhat. But as the new vaccines and treatments take effect throughout the population, new medical challenges are arising. In 1977 scientists reported the last recorded case of smallpox "in the wild," in the African country of Somalia. The virus is now believed to be extinct, except for laboratory samples maintained for research. In 1981 a vaccine for Hepatitis-B was approved. Genetically-engineered insulin was developed in 1977 and approved for use by the Food and Drug Administration in 1982. The first "test-tube baby" was born in England in 1978. A man lived for 112 days with an artificial heart implanted in his chest.

In 1976, though, 29 people at an American Legion convention died from a previously-unknown virus, now called "Legionnaire's Disease." And researchers at the Centers for Disease Control have been studying a mystery illness that destroys the body's immune system. It's called Acquired Immune Deficiency Syndrome, or AIDS. There's no cure in sight. Smoking and drinking continue to be major public health problems. Last year the American Heart Association for the first time listed smoking as a risk factor for stroke. And many states have been toughening laws on drunk driving, especially in light of research showing that half of all fatal accidents involve a drunk driver.

Environmental scientists are warning us to stop using spray cans. In 1976 the National Academy of Science reported that propellants in spray cans are depleting the earth's protective ozone layer. Two years later the government banned those propellants, called CFCs, and forced manufacturers to develop other ways to get out whatever's in a spray can.

Nuclear power may be on the way out, too. Opposition grew along with the environmental movement in the early '70s, focusing on what to do with nuclear waste and the disastrous potential of an accident at a nuclear power plant. Utility officials assured us that their plants were safe. But just such an accident occurred in 1979 at Three Mile Island, near Harrisburg, Pennsylvania. An inadvertent release of cooling water led to a partial meltdown of the reactor's core and an uncontrolled release of radiation into the air. Thankfully, no one was killed, but the nuclear power industry suffered a big loss of credibility as a result. America's nuclear power industry was born in Pennsylvania in 1957; its epitaph may have been written there in 1979.

The environment has also been affected by a variety of

"As an owner, you bask in the glory and also take responsibility for what doesn't go right. It's a different kind of attachment than just working for someone."*—Alan Dorhoffer, K2EEK, on the difference between being an employee of* CQ *and being one of its owners.*

response, the FCC issued more suspensions and revocations. The League started publicizing these censures in *QST* in a column entitled "FCC Censure-y Club." Well-publicized FCC enforcement actions continued, and one ex-ham (Richard Burton, ex-WB6JAC) eventually went to prison as a result of his activities. Even so, malicious interference is a black eye on ham radio that is with us to this day.

In 1980 hams participated in the run of the Olympic torch from Virginia to Lake Placid, New York. Hams also participated in emergency communications following disastrous floods in California, following Hurricane Allen and during the Cuban refugee boat lift.

1981

Both malicious interference and RF interference continued to grow as problems during 1981. As more and more new consumer electronic devices hit the marketplace, their susceptibility to RFI and, in some cases, their ability to *cause* RFI caused what appeared to be no end of headaches to amateurs and the FCC. Adding to the RFI problem was the CATV industry, which had many leaky cables emitting signals (sometimes on the amateur bands) out into the airways.

Once again Senator Barry Goldwater, K7UGA, introduced a bill to require stringent RFI protection for consumer electronic devices. As expected, the consumer electronics industry strongly opposed the proposed legislation. This time, however, the outcome was different (see 1982).

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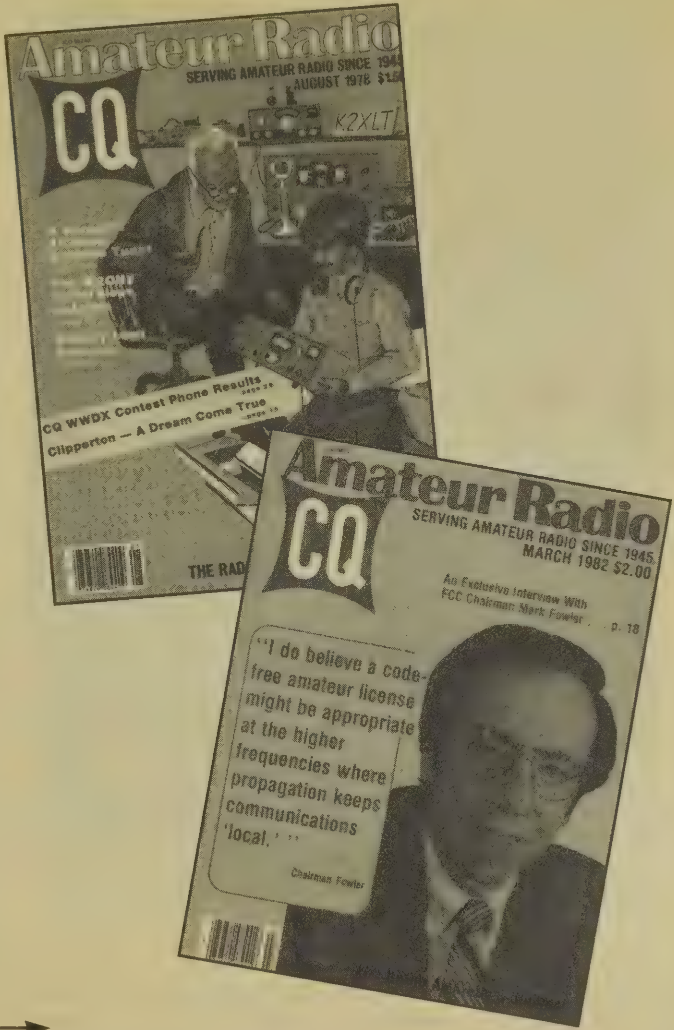
Amateur Radio
CQ
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AUGUST 1978
K2XLT
CQ WWDX Contest Phone Results
Clipperton — A Dream Come True
THE RAD
Amateur Radio
CQ
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An Exclusive Interview With FCC Chairman Mark Fowler . . . p. 18
"I do believe a code-free amateur license might be appropriate at the higher frequencies where propagation keeps communications 'local.'"
Chairman Fowler

natural disasters, such as the eruption of Mt. St. Helens in Washington State in 1980 and the El Chichon volcano in Mexico in 1982. The dust and gas from El Chichon has circled the earth and is reducing the amount of sunlight we get. We still don't know if there will be any long-term effects on world weather.

Short-term weather forecasts have been made more accurate by a full fleet of weather satellites, and domestic communications satellites are opening the door for greater live news coverage and many more programming choices for people with cable TV service. Speaking of TVs, by the end of 1975, there were more TVs in the United States than bathtubs. I'm not sure of the social significance of that.

Let's close this on a more pleasant note, with a look at sports achievements over the past ten years—and there have been plenty. There were two consecutive triple-crown winners in horse racing, Seattle Slew in 1977 and Affirmed in 1978; stock car racing "King" Richard Petty won a record seventh NASCAR championship in 1979; hockey star Wayne Gretsky has won five straight Hart trophies (the National Hockey League's most valuable player award), and is likely to continue his streak; heavyweight champion Muhammad Ali retired from boxing in 1979 after becoming the only man ever to win the heavyweight title three separate times.

In baseball Henry Aaron retired in 1976 with a record 755 home runs, plus additional all-time records in total bases and runs batted in; the American League expanded to fourteen teams in 1977, adding the Seattle Mariners and Toronto Blue Jays. The National League has yet to match the move. And both leagues were shut down for seven weeks in 1981, when the players went out on strike for the first time ever.

We've had three Olympic games in the past ten years—in 1976, 1980 and 1984. The 1980 winter games in Lake Placid, New York were by far the most exciting for American viewers, as the U.S. hockey team defeated the U.S.S.R. to win the gold medal and end the Soviets' 16-year hold on the championship; and American skater Eric Heiden made a clean sweep of the men's competitions, going home with five gold medals.

What's ahead for the next ten years? Well, if there's one thing I've learned in writing these historical overviews for 40 years now it's that I'm a pretty poor prophet. I do know this, though. I'm over 60 and I plan to retire long before 1995. I've enjoyed looking back at world events in this way, and I hope that whomever succeeds me here (if anyone) will choose to continue.

(Researched & Written by Richard S. Moseson, NW2L)

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Ham Radio History *cont.*

On the technical front, the Amateur Radio Research and Development Corporation (AMRAD) asked for and received special temporary authority to perform four spread-spectrum communications experiments, two on HF and two on VHF, by up to 25 hams. And the ARRL launched *QEX,* a magazine designed for experimenters, in order to publish articles that were too technical for *QST.*

In anticipation of the hams getting the WARC bands (see 1979), the FCC authorized a beacon station to operate on each of the new bands. Beginning with 10 MHz, the call KK2XJM could be heard indicating propagation on that band.

UoSAT-OSCAR 9 was successfully launched in 1981, giving European hams their first satellite. Also during the year AMSAT-OSCAR 7 went QRT.

Retired ARRL Technical Editor Lew McCoy, W1ICP, showed up on the masthead of *CQ* in August. Retired League staffer F. E. "Ed" Handy, W1BDI, and League General Counsel Bob Booth, W3PS, became Silent Keys. Ed was the first author of the *ARRL Handbook* and was the creator of Field Day and Sweepstakes and the forerunner of the Amateur Radio Emergency Service.

1982

Many of amateur radio's gains from WARC-79 were implemented in 1982. Hams in several countries got access to 10 MHz at the first of the year. However, because the U.S. Congress had yet to ratify the treaty, it would be October before U.S. hams would have access to the band, and then only on a limited basis. Senate ratification of the treaty finally came in December.

Congress also approved the "Goldwater Bill," after a six-year struggle, to give the FCC new teeth in combating RFI problems. The new law, PL 97-259, actually produced a potpourri of new regulations positively affecting our hobby.

The FCC was now able to establish RFI rejection standards for consumer electronic devices, and was authorized to set up an Amateur Auxiliary program to help track down errant hams. The law also authorized the FCC to extend amateur license terms to ten years and to set up a volunteer examiner program that would allow hams to prepare and administer amateur exams.

The FCC decided to allow FAX and television transmissions on all HF phone frequencies, thereby opening these types of transmissions to General class hams; it authorized virtually any type of digital communications above 50 MHz, and granted credit for amateur radio Morse code examinations to those who held commercial code licenses.

By year's end the FCC was also considering relaxing logging requirements, and the ham community was debating how best it would be served by the FCC's proposed HF phone band expansions.

In January the ARRL Board of Directors elected Vic Clark, W4KFC, to replace retiring President Harry Dannals, W2HD. One of the most respected hams in the world, Vic would serve less than two years, dying unexpectedly from a massive heart attack in late 1983.

In the DX world hams in China were starting to show up again on the air; and on the microwave bands, a trio of Italian hams made the first ever 10 GHz QSOs in excess of 1000 km (625 miles), extending the record to 1166 km (728 miles).

This year's Silent Keys included Dr. Jim Lawson, W2PV, and Dick Spencely, KV4AA. Jim was an avid contester and noted author. His designs of Yagi antennas were said by many to be years ahead of their time. And Dick, who had been *CQ*'s DX editor from 1952 to 1957, was *the* station to work in the U.S. Virgin Islands.

1983

This was a landmark year for amateur radio as Owen Garriott, W5LFL, became the first ham in space. Many of us who were hams at the time were glued to our 2 meter radios awaiting his signal from orbit. The first operator to make contact with Owen was Lance Collister, WA1JXN. Nearly 300 others would find their calls in Owen's log before the mission was over.

In other space news, OSCAR 10 was launched successfully in June. Another satellite that has outlived its predicted life, OSCAR 10 is still in limited use today. And, in an effort to boost interest in activity on VHF and higher frequency bands, the ARRL introduced the VHF/UHF Century Club (VUCC) award.

The year 1983 found the League and the FCC on opposite ends of the code-free license issue. In 1982 the FCC announced its intention to study the possibility of a code-free license, apparently believing it would have support from the ARRL. But the League's board of directors strongly opposed the concept and urged members to make their views known to the Commission. More than 5000 did so, with comments being 20 to 1 against the idea.

Finally, in December FCC Private Radio Bureau Chief Robert Foosaner recommended that the code-free license proposal be dropped permanently from FCC consideration. FCC Chairman Mark Fowler stated that the issue had been put to rest once and for all. (However, "once and for all" lasted only a few more years. In 1991 a code-free license became a reality.)

Other FCC actions affecting amateur radio included expansion of the 20 meter phone band (to its present-day privileges), changing the way that output power was to be measured (to PEP output power from DC input power) and extending license terms to ten years, with a two-year grace period for renewals.

Amateur radio received positive worldwide coverage during the Grenada invasion in October. Mark Barettella, KA2ORK, told (in January 1984 *CQ*) how he was a medical student at St. George's University. He had his equipment set up in his dorm room on campus, and when the invasion began, Mark suddenly found that he was one of two hams (the other was Don Atkinson, J37AH) who were the only sources of news about the invasion.

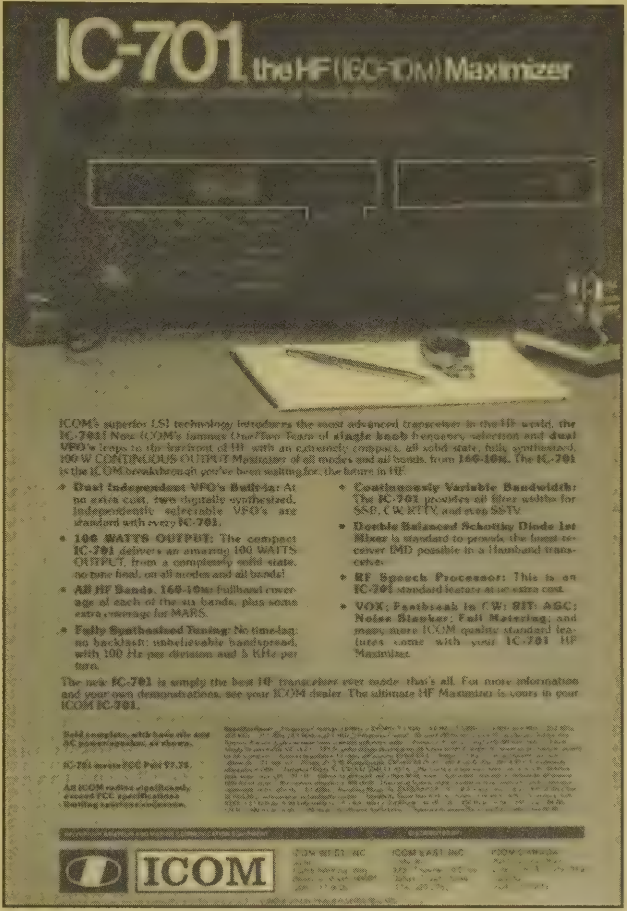
Mark relayed graphic accounts of action taking place near the university over 20 meters, and he provided the only link between his fellow students and their families during the crisis. Suddenly, hams who could not interest the local media in coverage of their local events were being called by those same media to provide the latest and only coverage of the invasion.

Amateurs also participated in natural disaster communications following flooding in Louisiana, the Coalinga, California, earthquake and Hurricane Alicia, which hit the Texas Gulf Coast.

The major technical advancement in 1983 was the growing use of AMTOR (Amateur Teleprinting Over Radio). Because of its use of an automatic "handshaking" technique for error checking of copy, its reliability was found to be error-free even during borderline propagation conditions.

1984

This was the year the FCC stopped giving amateur radio license exams, as the Volunteer Examiner program got started. The first testing took place in September at the ARRL Pacific Division Convention in Santa Clara, California. Besides easing the FCC's workload, the VE system made license exam sessions available in more places, more often and at more convenient times than ever before.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In July the FCC expanded the phone portions of the 80, 15 and 10 meter ham bands, granting the frequency allocations that exist today.

More than 700 hams participated in communications supporting the 1984 Summer Olympics in Los Angeles, California, and hams provided communications support for the Louisiana World Exposition between May and November.

The ARRL and its Canadian Division embarked on a five-year plan to separate the Canadian Division into an autonomous organization, the Canadian Radio Relay League.

In space communications, the UoSAT-OSCAR 11 satellite was successfully launched in March. And packet radio made great strides with two milestones. In July stations linked up through terrestrial repeater stations and OSCAR 10 to demonstrate the possibility of this type of interconnection. The following month Ralph Wallio, WØRPK, and Tom Clark, W3IWI, made what was believed to be the first meteor-scatter packet contact, that QSO taking place on 6 meters.

The face of amateur radio had changed dramatically since 1975. We had new bands, new privileges, a new way of taking license exams and a whole new operating mode—packet radio. But as sweeping as these changes had been, the perception was growing that amateur radio was becoming a hobby of old men, was being left in the dust of technical advancement and was even in danger of dying out. All that would change in the decade that lay ahead. ■

1985–1994: The Decade of Downsizing

Everything got smaller in the decade that just ended—the world, virtually anything electronic and, unfortunately for many of us, the companies we worked for. It was a decade of unbelievable change on the world scene, highlighted by the collapse of Communism in Europe and the reunification of Germany. In amateur radio it was the decade of no-code and computerized everything. Here at *CQ* it was a decade of solidity and growth, a pattern we hope will continue far into the future.

In the following articles Joe Lynch brings us up to date on ham history; Bryan Bergeron, NU1N, takes a look into the future; and "Joe" has retired, passing along his journal-writing duties to his successor.

Ham Radio History

1985-1994: Computers and No-Code

By Joe Lynch, N6CL

Ham radio in 1985 was at yet another turning point. Packet radio was entering the hobby's mainstream, virtually all new radios were completely solid-state and everything was getting smaller and smaller. But amateur equipment was also becoming too complex for the average ham to troubleshoot and repair, let alone design and build. The traditional ham radio—a hobby of builders and tinkerers—was quickly being replaced by a hobby of communicators. And those communication skills would be called on time and time again in the coming decade.

1985

Hams won a significant victory in 1985 in the battle against restrictive antenna ordinances. The FCC adopted PRB-1, which said that the FCC has preeminence in regulating antenna installations, and that state and local ordinances affecting antenna construction would have to comply with FCC regulations.

Specifically, the FCC required that state and local antenna ordinances "must be crafted to accommodate reasonably amateur communications and to represent the minimum practicable regulation to accomplish the local authority's legitimate purpose."

In another FCC action, hams gained access to two new WARC bands—24 MHz and 902 MHz. In the same action the FCC made permanent the ham authorization on 10 MHz. Additionally, this year the FCC authorized the use of Mode L (uplink on 1269.05–1269.85 MHz) for satellite communications and authorized FAX and TV transmissions on 160 meters.

In space communications Astronaut Tony England, W0ORE, became the second ham in space aboard the Shuttle *Challenger*. Tony had a first of his own, exchanging slow-scan TV signals with hams and school children around the country.

In November the world learned via amateur radio of the tragic eruption of a Colombian volcano. Unfortunately, the

Sarah's Journal

January 1995

It feels strange to be writing this instead of reading it. When I was growing up, the only parts of Dad's journal I was allowed to read were his decade-by-decade accounts of world events. And when Dad retired three years ago, he left me in charge of this journal as well as the company. I've read it from cover to cover. The daily entries have helped me understand how our company has gotten to where it is today. And Dad's end-of-decade entries have helped me understand how our world has gotten to where it is today. I'm glad that Dad agreed to have these entries published. And I hope that I can maintain his high standards of historical reporting.

Once again, we didn't blow ourselves up. And we managed to stay out of any long-term shooting wars between 1985 and 1994. We even managed to defrost the Cold War. The collapse of Communism was the decade's major story on the world stage. Here at home it was the Decade of Downsizing.

The beginning of the end for Communism in Europe came back in 1979 and 1980, with the Soviet invasion of Afghanistan and the rise of the Solidarity labor movement in Poland. Even though Solidarity was banned in 1981, and its leader, Lech Walesa, was jailed, the union never went away. It just went underground. And the continuing war in Afghanistan cost thousands of lives and put a severe strain on the Soviet Union's military and economic power. Coupled with rampant corruption and inefficiency in business and government, the USSR was fast becoming a superpower that couldn't feed its own people.

Mikhail Gorbachev came to power in Moscow in 1985, after the death of Konstantin Chernenko. After decades of stodgy old men running the Kremlin, Gorbachev was a breath of fresh air, both to the Soviet people and to other world leaders. He understood the power of television. He knew how to "work a crowd." He had a sense of humor. And his wife, Raisa, wasn't afraid to be seen in public.

But neither Gorbachev's new image for Soviet leadership nor his widely publicized reforms—*glasnost*, or "openness," and *perestroika*, "restructuring"—were enough to save the Soviet system. When a nationwide strike by Soviet coal miners brought government concessions instead of a violent crackdown, Communist governments in Eastern Europe

CQ's "Guiding Lights"

***CQ* Editor, 1985–1994**
Alan Dorhoffer, K2EEK
***CQ* Publisher, 1985–1994**
Dick Ross, K2MGA

At the beginning of our special anniversary section you'll find excerpts of *CQ*'s first editorial, setting out the magazine's philosophy at the time. We'd like to close by taking a look at the editorial philosophy that guides *CQ* today. Considering how much amateur radio has changed since 1945, it is truly remarkable that our magazine's basic philosophy is the same today as it was 50 years ago.

"My philosophy has always been people-oriented, people who are doing things, rather than purely an educational vehicle," explains *CQ* Editor Alan Dorhoffer, K2EEK. "I've tried to steer the magazine to the active amateur using the equipment on a regular basis. Ham radio is people interacting with other people. Our columns are designed to encourage people to try things they haven't tried, and to broaden the hobby. The act of *doing*, whether it's contests or awards, that's been my outlook."

"In addition," says Dorhoffer, "we have tried to broaden our readership by including more people. In recent years we have broadened our contest categories to include more groups; we have broadened our award categories to include more specialized modes, to attract more Novices and Technicians and to reinforce the fact that our award and contest programs are universal and worldwide."

CQ, under its current ownership, has also taken on leadership beyond the pages of the magazine—for example, by leading the Amateur Radio Industry Group for the past several years.

"In the 15 years that we've owned *CQ*," says Publisher Dick Ross, K2MGA, "we've tried to become more proactive, trying to make things happen in the hobby. We've felt that in the past 20 years or so there has been an absence of strong leadership in the hobby, and we've tried to provide some of that."

tragedy struck amateur radio as well. Ramon Antonio Rodriguez, HK6HTC, the Mayor of Armero, a town in the path of the volcano's debris, was providing emergency communications when he and his entire family perished after his home was engulfed by mud and water. Additionally, Lucho de la Torre, HK6FDE, lost his entire immediate family during the disaster.

Hams provided communications in many other disasters during the year. These events included wildfires in California, an earthquake in Mexico, Hurricanes Elena and Gloria and a plane crash at the Dallas-Ft. Worth airport.

Well-known DXer Don Wallace, W6AM, became a Silent Key this year. He had worked the world (literally) with a huge rhombic array in Palos Verdes Estates, California.

1986

Two hams—Dick Rutan, KB6LQS, and Jeana Yeager, KB6LQR—piloted the experimental *Voyager* airplane nonstop around the world on a record-breaking 26,000 mile flight.

During Field Day, Larry Tyree, N6TR, made what are believed to be the first automated QSOs. Using a Z80 computer and a Kenwood TS430, Larry's station sought out Field Day participants and completed CW QSOs with them.

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took notice. And instead of merely following Moscow's lead, they built on it.

Poland's government restored Solidarity to legal status and ordered free elections, confident that its "liberalization" would win public support. But Solidarity candidates won 92 of 100 seats in the Polish Senate. And a top advisor to Solidarity founder Lech Walesa became Poland's first non-Communist Prime Minister since World War II.

Then Hungary opened its border with Austria. And thousands of East Germans, who were permitted to travel to Communist Hungary, went on "vacation" there and never returned. East Germany tried to stem the tide. But it was too late. On November 11, 1989 East German authorities opened the gates in the Berlin Wall. For the first time in 28 years East Berliners were free to visit West Berlin. Berliners rejoiced, then took up sledge hammers and crowbars, "and the wall came tumbling down." The primary symbol of Communist repression had been smashed.

The die was cast. In Czechoslovakia, Romania, Yugoslavia, East Germany, Hungary, Poland and even Albania, Communist governments resigned or were forced from power. Some changeovers were peaceful; others violent. But for pure drama, it was hard to match what happened in the Soviet Union itself in the summer of 1991.

As the Communist Party's grip on power there began to loosen, several key leaders resigned from the party, including populist "maverick" Boris Yeltsin, who had been elected President of the Russian Republic. The USSR was composed of 15 supposedly sovereign republics, none of which ever had much sovereignty. But now independence movements were starting to crop up, and Gorbachev negotiated a new "Union Treaty" with the republics' presidents in an effort to preserve unity.

Just before the new treaty was due to take effect, further diminishing Moscow's central authority, hard-line members of the Communist Party's ruling Politburo staged a "palace coup," holding Gorbachev prisoner in his vacation home while announcing publicly that he was ill and could not continue in office. The coup leaders sent tanks to surround Boris Yeltsin's Russian parliament building. But the soldiers were easily convinced to swing their turrets *away* from the so-called "White House," and Yeltsin himself climbed atop one of the tanks to proclaim his opposition to the coup. (During all this Yeltsin kept in contact with the outside world by, what else, amateur radio.)

Within days the coup collapsed. Gorbachev returned to

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Ham Radio History *cont.*

In space Japan made its entry into amateur satellites with Fuji-OSCAR-12. The Soviet Union also joined the ham-in-space program with the launch of its MIR space station, and hams celebrated the 25th anniversary of the launch of OSCAR 1.

Hams also provided communications for extraordinary events such as the Hands Across America celebration (over 3500 hams participated), the UNICEF torch relay and the Operation Sail event at the Statue of Liberty centennial celebration.

In FCC action, hams were authorized more frequencies in the Amateur Satellite Service, given credit for written exam elements passed during an unsuccessful test session and given permission for transmitting third-party traffic by unattended stations operating on frequencies above 50 MHz. The FCC also authorized spread-spectrum transmissions on ham bands above 420 MHz.

1987

It seemed that this was a year in which the FCC wanted both to give and take away.

On the giving side, there was Novice Enhancement. Novices got phone privileges on 10 meters (plus a substantially expanded sub-band), as well as phone privileges on portions of both the 125 cm and 23 cm ham bands. Since Technicians also had Novice HF privileges, they too were allowed onto 10 meter phone. This action spurred amateur license growth from a worrisome one to two percent annual rate to a more respectable six to seven percent rate.

On the take-away side, the FCC proposed reallocating 220-222 MHz to the land mobile service. In a bitterly fought battle, the ARRL even took the FCC to federal court to oppose the loss of those frequencies, all to no avail. Finally, in August 1991 hams were ordered off that portion of the band. Ironically, to this date no clear-cut decision has been made concerning the use of those frequencies. Plus, a proposal to allocate one megahertz between 216 and 220 MHz for amateur digital use is still pending.

In a peculiar way, nature moved to help support the hams' cause for the band when the first-ever sporadic-E contact on 220 MHz took place between Bill Duval, K5UGM, near Dallas, and John Moore, W5HUQ, in Orange Park, Florida.

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Sarah's Journal *cont.*

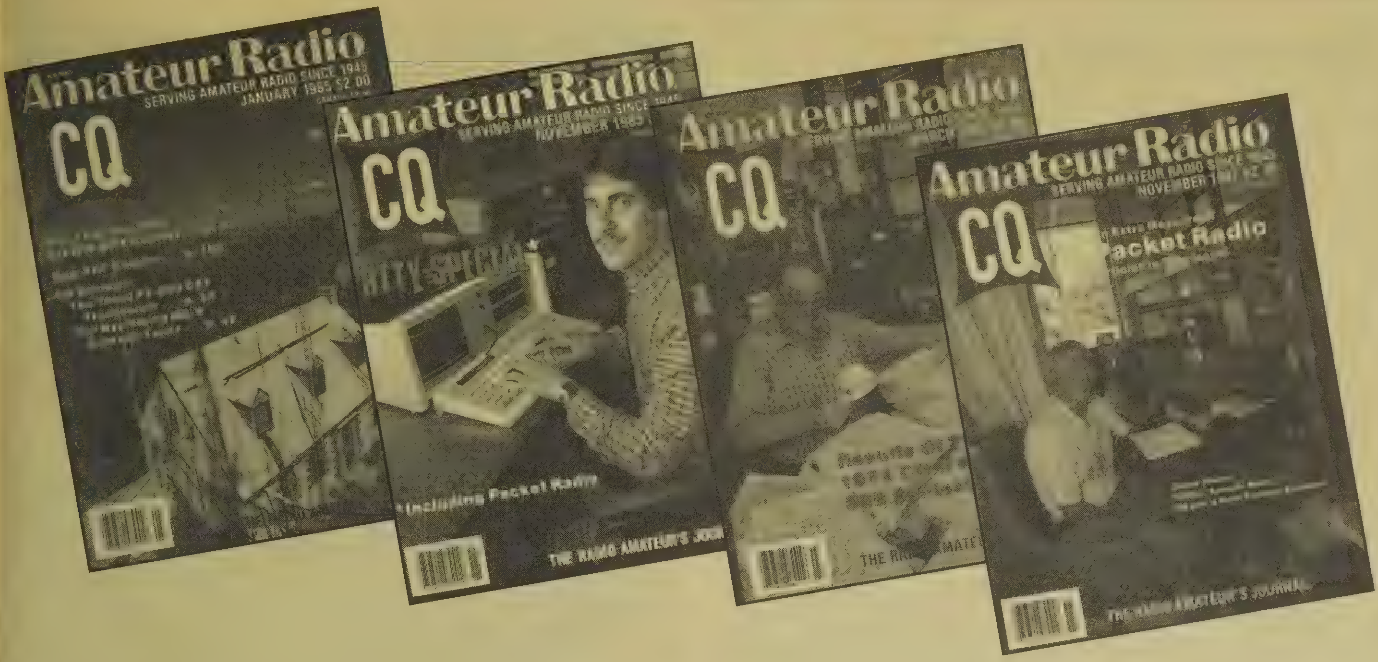
power, but it was clear that Boris Yeltsin held most of the cards. By year's end the Soviet Union ceased to exist. It was replaced by a loose economic and military confederation among most of the former Soviet republics called the Commonwealth of Independent States.

I wish I could say that everyone lived happily ever after, but that hasn't been the case. Yeltsin has had a continuing struggle to rebuild Russia's economy, and he even had to put down a 1993 revolt by hard-liners trying to restore Communism. Czechoslovakia split itself in two, becoming the Czech Republic and Slovakia. And Yugoslavia broke up, too. But unlike the Czech split, which was peaceful, civil war broke out in the former Yugoslav republics, along with some of the worst atrocities since World War II. As I write this there are some hopeful signs, but the fighting continues.

Speaking of fighting, the Russians finally pulled their troops out of Afghanistan in 1989, and the Moscow-backed government there fell to the rebels in 1992. The other major military hotspot in the past decade has been—once again—the Middle East. But this time Israel was on the sidelines as Arab nations fought among themselves. And the United States got involved this time, big-time.

After the Iran-Iraq war ended inconclusively in 1988 (nine years after it started), Iraqi President Saddam Hussein apparently had nothing better for his soldiers to do. Therefore, in the summer of 1990, on the flimsiest of pretexts, Iraq invaded and quickly occupied the tiny but very wealthy Emirate of Kuwait. The troops then turned toward Saudi Arabia. Faced with an imminent threat to our supplies of oil, President George Bush (who succeeded Reagan in 1989 after eight years as Vice-President) quickly built an international coalition to oppose Iraq and sent 230,000 U.S. troops to protec Saudi Arabia in what was called "Operation Desert Shield." When Iraq continued its buildup, Bush sent another 200,00 troops to the region. The United Nations gave Saddam Hussein until January 15, 1991 to pull out of Kuwait. He didn't, and on January 16 "Desert Shield" became "Desert Storm" as the U.S. unleashed the most devastating air assault ever against Iraqi positions. When they still didn't leave, Bush launched a ground war that liberated Kuwait an decimated Iraq's army in just four days. It was the largest mi itary operation ever undertaken. Period.

Bush kept the operation within the bounds of the UN res-



The QSO was made within the disputed frequency segment.

Beginning this year and continuing throughout 1988, selected ham club station calls across the country (in all 50 states during the week of their admittance anniversary date) were allowed to replace the digit in their prefix with "200" in honor of the bicentennial of the U.S. Constitution. The ARRL offered a one-time "We The People" WAS award with a special endorsement for working the "200" stations in each state.

The FCC proposed "privatizing" the issuance of some call signs. This "on-again, off-again" proposal took on several forms, with the last version being the private issuance of club calls. (The proposal was ultimately withdrawn by the FCC in 1993, when it introduced a still-pending plan to issue "vanity" calls.)

The FCC also granted Special Temporary Authority permits to use unattended packet stations on HF. These STAs were renewed annually until the FCC in 1994 proposed permanent changes in the rules regarding unattended operations on HF. To date these rules have not been implemented.

Amateur radio operators provided emergency communications assistance before and after the Saragosa, Texas tornado, and following the volcanic eruption and subsequent earthquakes in Ecuador.

1988

At the first of the year the Canadian Radio Relay League took over all functions of the former Canadian Division of the ARRL. This created two major societies in Canada, the sec-

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olution that authorized it, and wouldn't let our troops advance on Baghdad or try to topple Saddam Hussein's government. Looking back, that may have been a mistake, since last October Iraq once again began massing troops and tanks at Kuwait's border. Bush's successor, Bill Clinton, promptly ordered thousands of U.S. troops back to the region to protect Kuwait. Iraq backed off, but the situation is still very volatile.

Relations between Israel and its Arab neighbors are slowly improving. The historic 1979 peace treaty with Egypt has been followed more recently with a limited self-rule agreement for Palestinians living in the West Bank and Gaza, negotiations with Syria over the Golan Heights and a formal peace treaty with Jordan late in 1994.

One other world hot spot that's cooled down in the past decade is South Africa, which had been treated as an outcast by most countries because of its policy of apartheid, or forced separation of whites and blacks. The whites, who were descended from European settlers, held virtually all of the country's political and economic power, even though they were in the minority. In 1991 South Africa's parliament voted to repeal the apartheid laws; and in 1992 the country's white voters overwhelmingly approved a plan for majority rule. Anti-apartheid leader Nelson Mandela, who was imprisoned by South African authorities for more than 27 years, is today his country's president.

Here at home we're on our third president in ten years. Ronald Reagan became the first President since Eisenhower to serve two full terms; he was succeeded by his Vice-President, George Bush, who won largely on the strength of a single campaign promise: "Read my lips. No new taxes." When he had to raise taxes anyway, the Democrats made sure that promise was remembered. Bush lost in 1992, amid high unemployment, to Arkansas Governor Bill Clinton. Clinton's big push in the first half of his term has been to "reinvent government" and reform the nation's health insurance system. He's had little success so far on either count. One thing in Clinton's favor: he's the first president you can complain to via e-mail!

E-mail—now there's something that hardly existed a decade ago, and today is a major means of personal and business communication. Computers got smaller and more powerful, shrinking to laptop, notebook and even "sub-notebook" size, and people have become almost totally reliant on them for a wide variety of business tasks—notably communication. You can write a letter and fax it to its destina-

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Ham Radio History *cont.*

ond being the Canadian Amateur Radio Federation.

Ham radio operators participated in emergency communications following Hurricane Gilbert, which devastated Jamaica, and the Soviet Armenian earthquake. Hams were also responsible for communications during the joint Canadian-USSR polar skiing expedition, SKITREK. During the 1250 mile trip the expeditioners kept track of their whereabouts via UoSAT-OSCAR 11.

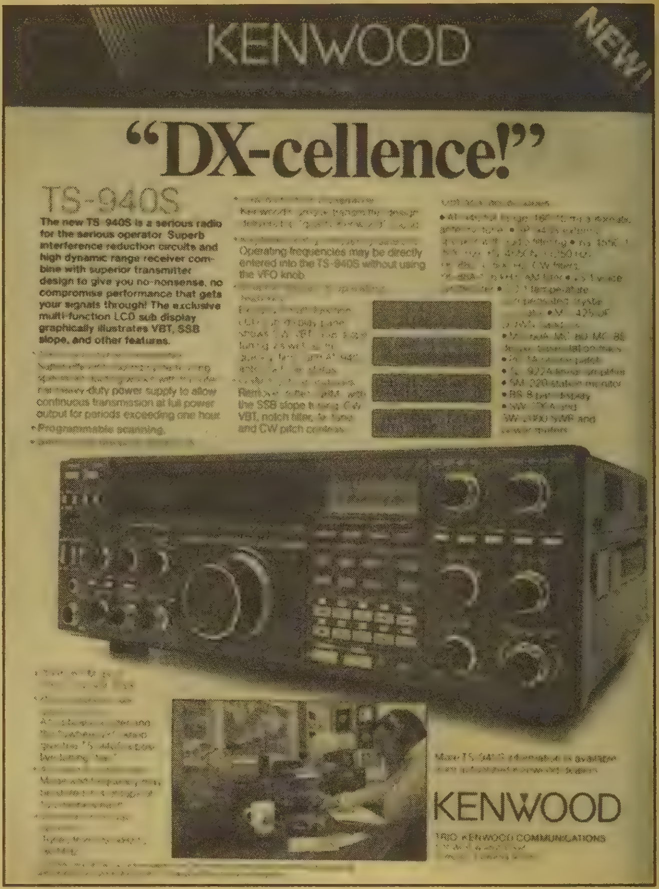
A second Molniya, or elliptically-orbiting satellite, OSCAR 13 was successfully launched in 1988. To this day OSCAR 13 remains the workhorse satellite, providing large areas of the earth with hours of operating time during each orbit.

Amateur radio fiction writer Tommy Tomkins, K6ATX, became a Silent Key. Known best for his series of young people's books that had ham radio as their major theme, Tommy also wrote for *National Geographic, Popular Electronics, CQ* and *QST* magazines. His last book, *Murder by QRM,* was released in 1989. Other Silent Keys were General Loren G. Windom, W8GZ, who developed the antenna named after him; Bob Henry, W0ARA, of Henry Radio; and Ambassador Bill Porter, who was U.S. Ambassador when Israel became a nation and later was a U.S. Ambassador to Vietnam. During the latter assignment Porter held the call XV5AA.

Andrew Bodony, K2LE, successfully won his lawsuit against the Village of Sands Point, New York, using FCC PRB-1 as evidence. This marked the first time that PRB-1 received a court challenge, thereby setting a legal precedent for future cases.

1989

The last of the WARC-79 bands, 17 meters, became available in January.



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The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

Operating frequencies may be directly entered into the TS-940S without using the VFO knob.

KENWOOD

Hams from the Leeward Islands to the Carolinas were involved in emergency communications following devastating Hurricane Hugo. Herculean efforts by hams were recognized widely. In Montserrat, Bobby Martin, VP2MO, was knighted for his three days of non-stop communications after

Sarah's Journal *cont.*

tion right from your computer, or you can e-mail it instantly to the other side of the world.

The worldwide e-mail network—pioneered by amateur radio packet networks—blossomed when the major commercial computer networks (such as MCIMail, CompuServe, etc.) linked their mail servers through the Internet, the first-generation "information superhighway" that we hear so much about today. The Internet began as a way of linking research universities and government agencies. It quickly spread around the world, and the entry of commercial services and a host of other business users is rapidly changing its character (much to the dismay of old-time users). On the horizon is what's being called the "convergence" of data, fax, telephone and video transmissions, using optical cables that carry information on beams of light. Already the phone companies are starting to experiment with offering customers video services, and the cable TV companies are looking at using their networks to provide two-way communications.

If you need to actually *talk* to someone, you never know if you're reaching them at their office, at home or even in their car. Cellular radio technology has made car phones commonplace, letting even non-hams get into accidents because they were paying more attention to their conversations than to the road.

This new-found ability to communicate and conduct business from virtually anywhere has come just in time for millions of American workers caught in the squeeze of "downsizing." The economic recovery of the mid-80s, it seems, was built on too-easy credit and expansion based on "leveraged buyouts" with no real money behind them. When investments and businesses failed to perform as expected, the whole house of cards began to fall.

The savings and loan industry, deregulated in the early 80s because it was paying out more in interest to depositors than it was taking in from borrowers, sank in a morass of bad investments and outright fraud. Only a massive bailout by the federal government saved the system from total collapse.

And businesses suddenly found that they had to do more with less. One after another of America's biggest companies embarked on multiple rounds of layoffs, plant closings and general belt-tightening. There's one big difference from the past, though. Many of the jobs that have been eliminated in the past ten years simply aren't coming back. And extremely talented people have been finding themselves on long-

CQ *Publisher Dick Ross, K2MGA, Technical Editor Lew McCoy, W1ICP, and Editor Alan Dorhoffer, K2EEK, at the 1989 Dayton Hamvention*

Hugo nearly destroyed every structure on that island.

Barely a month later, hams on the U.S. west coast were involved in emergency communications following the San Francisco earthquake. In that incident packet radio showed its usefulness in handling large volumes of emergency traffic plus numerous health and welfare messages.

On the microwave bands, Willy Bauer, LX1DB, completed the first 1296 MHz WAC. Also Dave Chase, KY7B, completed the first VUCC on 300 GHz by using lasers operating on 678 GHz.

The ARRL celebrated its 75th anniversary all year long through its magazine, *QST*. And amid growing calls for a code-free, entry-level amateur radio license, and signs that the FCC intended to create one with or without the ARRL's cooperation, the League appointed a committee to study the feasibility. Later in the year, in a dramatic reversal of earlier positions, the ARRL petitioned the FCC for a code-free license. Also petitioning the FCC were the Quarter Century Wireless Association (QCWA) and about a dozen others. After first proposing to replace the Novice and Technician licenses with a new, code-free Communicator Class, the FCC adopted QCWA's recommendation to simply drop the code requirement from the Technician license and withhold HF operating privileges until a code exam was passed. This resulted in our current Technician/Technician-Plus licensing structure.

Bill Eitel, W6UF, became a Silent Key. Bill had joined with Jack McCullough, W6CHE, to form Eimac (the name "Eimac" is a hybrid of their two last names), a major manufacturer of high-power RF tubes. On the *CQ* staff, both Bernie Welch, W8IMZ (WPX Contest Chairman), and Frank Anzalone, W1WY (former "Contest Calendar" column editor), became Silent Keys.

Ham Radio magazine was sold to CQ Communications, which ceased publishing the magazine. In its place in the fall, *Communications Quarterly* premiered, edited by *HR*'s last editor, Terry Northup (now Littlefield), KA1STC.

1990

The beginning of the year saw a major operation from Bouvet Island (3Y5X). While thousands of hams made contact with the DXpedition, hundreds caused interference to the operation and 240 U.S. hams were cited for out-of-band phone operation. The "success" of the operation was treated to mixed reviews in the amateur radio community.

A bundle of satellites was successfully launched in January. The first two were designated UoSAT-OSCARs 14 and 15, respectively. The last four, called microsats for their miniature size, were named OSCARs 16–19. These latter four are still orbiting. OSCARs 16 and 19 were the first pack-

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term unemployment, because there just aren't any more jobs in their fields.

That's why our latest communication revolution has been a lifesaver for many people. With a computer and printer, a modem and a fax machine, it's possible today to conduct many types of business as easily from home or from a one-person office as from a corner office on the 33rd floor. And that's making it possible for millions of Americans to work from home, either as small-business owners or as full- or part-time "telecommuters." While downsizing is certainly traumatic for the people and the businesses directly affected, it may be a positive trend in the long run, as thousands of highly-talented people help infuse small businesses with new ideas and new energy.

One prominent victim of downsizing has been America's space program. On the 20th anniversary of man's first moon landing, in 1989, President Bush spoke about building a space station, a permanent moon base and a manned mission to Mars. Five years later only the space station remained under serious consideration, and many people have their doubts about that as well. For now our space program consists of regular shuttle flights to conduct various experiments, to launch satellites and to perform other assignments.

Actually, the decade started out well for space science in general. In 1985 researchers at Cornell University, studying images collected by the orbiting Infrared Astronomical Satellite (IRAS), reported the discovery of eight new galaxies. String-shaped radio sources, called "threads," were found at the center of our galaxy, and Voyager 2 flew by Uranus in 1986, sending back pictures of the planet's rings and ten previously-unknown moons. Also in 1986 the Soviets launched a permanently-manned space station called "Mir," or "peace." Crew members with ham licenses also made it the first permanently-manned ham station in space.

The U.S. space program went into virtual shutdown in 1986, after the explosion of the shuttle Challenger just after liftoff one cold January morning. Six astronauts and the first "teacher-in-space," Christa McAuliffe, were killed. Shuttle flights resumed in 1988 after a major investigation and reshuffling at the space agency.

Voyager 2, blissfully unaware of all this, went on making incredible discoveries. It flew past Neptune in 1989, returning magnificent photos of the planet and its moons. Voyager continues to send back signals as it heads out of our solar system.

NASA had less luck with a newer space probe. The Mars

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Ham Radio History *cont.*

et radio satellites. Later in the year construction began on Phase III-D, a high-earth-orbit satellite that will permit operation on several bands. Expected launch date of this very ambitious multi-national project is April 1996. By the end of 1990, Ron Parise, WA4SIR, was giving out contacts from on board the Shuttle *Columbia*.

After the DOVE satellite got stuck in the transmit mode, Dave Blaschke, W5UN, used his giant EME array to blast a signal to it to get it unstuck. Just weeks later, Dave's "Mighty Big Array" was destroyed by high winds emanating from a nearby tornado. Undaunted, Dave rebuilt the array so that he could work the remaining three countries he needed to become the first to achieve DXCC on 2 meters and EME. He achieved that goal in October.

CQ *Publisher Dick Ross, K2MGA, in his office, 1989.*

Another DXCC first was achieved by Lee Fish, K5FF, followed in second place by her husband, Fred, W5FF, who claimed DXCC number 1 and 2 on 50 MHz, respectively.

Gus Browning, W4BPD, noted DXer and DXpeditioner, became a Silent Key. Before the days of the keyboard and computerized logging, Gus taught himself how to write with his left hand so that he could simultaneously send with one hand and write with the other. Also becoming a Silent Key was General Curtis LeMay, W6EZV, former Air Force Chief of Staff and a Vice-Presidential candidate.

Over the summer Seattle, Washington became the site of the U.S.-hosted World Radiosport Team Championships. Twenty-two 2-man teams competed over the several-hour contest, with the winner being the team of *CQ* "Contest Calendar" column editor John Dorr, K1AR, and *CQ Amateur Radio Almanac* editor Doug Grant, K1DG.

By the end of the year hams were particpating in Operation Desert Shield through MARS operations with the military in the mideast.

1991

Amateur radio began a new era in February, as the new code-free Technician class license became a reality. The first code-free license went to Robert N. Williams, N3IYF. In other FCC actions the 80 meter Novice code sub-band was moved down 25 kHz in January. And in August hams were required to vacate the bottom 2 MHz of the 220 MHz band. Meanwhile, the ARRL petitioned the FCC for access to a frequency sub-band between 216 and 220 MHz for point-to-point digital links. (This request is still pending as of the writing of this article.)

As Operation Desert Shield became Operation Desert Storm, hams continued their involvement as MARS operators, receiving MARSGRAMS and phone patches from servicemen and women stationed in the Gulf area.

Two remarkable stories came out of Desert Storm, both

Sarah's Journal *cont.*

Observer, an unmanned craft launched in 1992 to map the surface of Mars, suddenly stopped transmitting just three days before it was due to begin orbiting the red planet. The cause of the malfunction is still unknown.

The shuttle program recovered some of its lost credibility with the 1990 capture of the Long Duration Exposure Facility, placed in orbit nearly six years earlier; the 1990 launch of the Hubble Space Telescope, and a subsequent repair mission to correct flaws discovered in the lens; and the 1992 rescue, repair and redeployment of a stranded communication satellite. For hams, a highlight came in 1991, when a shuttle was launched carrying an all-ham crew! Amateur radio has been a part of many space flights, through SAREX, the Shuttle Amateur Radio Experiment, and contacts made by hams aboard Mir, the Russian space station.

Another triumph for hams in science was in 1993, when astronomers Joseph Taylor, K1JT, and Russell Hulse (a former ham) won the Nobel Prize for Physics for their discovery of the first known binary pulsar. Taylor credited amateur radio with sparking the interest that led to his career.

Other scientific items of note during the decade were the discoveries in 1985 of a hole in the ozone layer over Antarctica (the penguins must be using too many spray cans), and in 1986 of a huge plume of hot water rising from the floor of the Pacific Ocean. Oceanographers think it's from a vent in the ocean floor where two tectonic plates are pulling apart.

Those plates that make up the Earth's crust were unusually busy in the past ten years. There were major earthquakes in Mexico (1985), Armenia (1988), San Francisco (1989), Iran (1990), Los Angeles (1994) and in the ocean off Japan (1994). Plus, volcanic eruptions rocked Colombia in 1985 and the Philippines in 1991. Other natural disasters of note include Hurricanes Hugo (1989) and Andrew (1992), which wreaked havoc in the southeast, and massive flooding along the Mississippi/Missouri River system in 1993. Hams have been kept very busy, providing emergency communications from those areas.

There were also a few "unnatural" disasters, including an explosion at a nuclear power plant in Chernobyl, USSR, in 1986; the 1988 terrorist bombing of a Pan Am 747 in fligh over Lockerbie, Scotland; a massive oil spill off the coast of

Full Circle
The *ES&T* Story

CQ is descended from *Radio* magazine, which Sanford Cowan and John Potts bought from its west coast publishers during World War II. *CQ*'s history, however, is inextricably intertwined with another magazine—one that never had anything to do with amateur radio. It was, and is, a trade magazine for electronic servicing professionals.

Sanford Cowan, *CQ*'s founding publisher, recalls that he started out selling advertising for a magazine called *Radio Engineering* until a competitor named *Electronics* came along. "When I suggested (to the editor) that he improve it to compete with *Electronics,* he wasn't interested, so I started my own magazine, called *Radio Service Dealer.* And that's how I got started as a magazine publisher."

It was *Radio Service Dealer* that put Cowan in the financial position to buy *Radio* when it became available, and it helped support *CQ* during its leaner years. Over time the magazine changed titles, first to *Radio/TV Service Dealer* and then to *Electronic Service Dealer.* Over the years Cowan's publishing business expanded further.

"We also started a magazine called *S9,* for CBers, and other magazines," Cowan recalls today. "The very best of them was *Solid State Technology,* which was responsible for many of the advances in electronics technology."

But Sanford Cowan's first magazine was always the closest to his heart.

"In 1958," according to his son, Richard Cowan, WA2LRO, "he had to sell *Electronic Servicing* or shut it down. He sold it to Howard Sams, but it broke his heart and he had no more desire to come to work every day, so I took over as the publisher."

But the story doesn't end there. Current *CQ* Publisher Dick Ross, K2MGA, picks up the next chapter in 1990, eleven years after he and Alan Dorhoffer bought *CQ* from the Cowans: "We were contacted by a magazine broker with a blind inquiry. And even though the magazine was not identified by name, the description made clear which magazine it was. Back in 1958 *Service Dealer* was probably the biggest of four magazines in its field. Eventually, four became two, and two became one—*Electronic Servicing and Technology.* I was able to put together a mutually-beneficial purchase agreement for the magazine and brought it in-house. It's been a very successful and profitable magazine for us." Thirty-two years after being sold, *CQ*'s sister magazine was home again.—*NW2L*

involving packet. In the first story, following the forwarding of a message by an anti-war group over packet, the FCC cited eleven packet operators for carrying "commercial" traffic. After months of wrangling the FCC rescinded nearly all the citations (three recipients lost their STAs for automatic forwarding via unattended stations, however). Eventually, the FCC declared that the originator and the "first forwarder" of a message will be the only ones held responsible for its content.

In the second story, Abdul Jabbar Marafi, 9K2DZ, remaining in Kuwait after the Iraqi invasion, stayed on the air with a rig that was hidden in his basement and forwarded valuable information to U.S. hams despite the danger of being caught and killed at any time. *(Marafi was actually using*

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Alaska when the tanker Exxon Valdez ran aground in 1989; and the terrorist bombing of the World Trade Center in New York City in 1993.

The world of medicine saw progress in both new and traditional areas. AIDS came into the spotlight in 1985, when movie star Rock Hudson died of the disease. Researchers identified the viruses that cause AIDS in 1986, but are still searching for a vaccine and/or a cure.

Lasers were used for the first time in 1985 to clean out clogged arteries. And in 1986 the U.S. government approved a hepatitis-B vaccine developed through genetic engineering. The Patent Office took the next step in 1988, granting Harvard Medical School a patent for a genetically-engineered mouse—the first patent ever issued for a vertebrate! And in 1990 the Supreme Court ruled that a terminally-ill person has a "right to die" if that person has made his/her wishes clearly known in advance.

Speaking of the Supreme Court, six of its nine seats changed hands in the past decade. Chief Justice Warren Burger retired in 1986 and Justice William Rehnquist was named to replace him. Antonin Scalia filled Rehnquist's seat as an Associate Justice. Other new faces on the top court include Anthony Kennedy (1988), David Souter (1990), Clarence Thomas (1991) and Ruth Bader Ginsburg (1993). Former Chief Justice Burger led the celebration of the U.S. Constitution's bicentennial in 1987 (a year after the centennial of the Statue of Liberty). The latest amendment to the Constitution (the 27th) was approved when Michigan okayed it in 1992—more than 200 years after James Madison wrote it and Congress sent it to the states! (It says that anytime Congress votes itself a pay raise, it can't take effect until after the next election.)

True to Dad's tradition, I'm rambling on too long here. So I'll close, as Dad liked to, with a look at some highlights, and lowlights, from the world of sports.

In baseball Pete Rose broke Ty Cobb's all-time major league hits record in 1985, then got bounced from baseball for life in 1989 for betting on games. Nolan Ryan retired from baseball in 1993 with five all-time records, after breaking the 5,000 strikeout mark in 1989 and pitching his seventh no-hitter in 1991. The Major Leagues expanded to 14 teams each after the 1993 season and revamped the playoff system for 1994. But the players went out on strike in August, forcing cancellation of the rest of the season. There was no World Series for the first time in 90 years. Most fans have no sympathy for either the players or the owners. One

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Ham Radio History *cont.*

APLINK, a hybrid of packet and AMTOR, for his transmissions.—ed.) After the liberation of Kuwait, information on the Marafi's heroic deeds made its way into the world's press.

In another political arena, several U.S. and Canadian hams were involved in tense communications with hams in Lithuania and Latvia in early January as those countries faced possible attack by Soviet troops. Some feel that trouble was averted because ham radio communication was present and because the world knew of the potential threat.

Ironically, history and ham radio's involvement would repeat itself in August as the Soviet Union itself was under siege from a coup attempt. Again amateur radio provided the world with information about events as they were taking place.

Rasheed Jalal, YK1AA, Syria's first ham, became a Silent Key this year. And former Indian Prime Minister Rajiv Gandhi, VU2RG, was assassinated during a political comeback. Also Silent Keys in 1991 were Walt Henry, W6ZN, the surviving founding brother of Henry Radio; Lester Cushman, W1BX, the founder of Cushcraft; and Bill Carter, KM5R, a ham who fell from his tower after climbing without a safety belt.

In space another first was achieved, as all the crew members of Shuttle *Atlantis* mission number STS-37 were hams. Dubbed the "educational mission," this trip of the shuttle concentrated on working stations set up in schools and, when possible, exchanging fast-scan TV signals (yet another first).

On the DX bands the rarest country in the world returned to amateur radio in mid-September. In excess of 50,000 worked ZA1A, a station set up during training sessions for potential new hams in Albania. By year's end Albania plummeted on DXers' most-wanted lists.

On the microwave bands Chip Angle, N6CA, and Paul Lieb, KH6HME, completed contacts on 3456 and 5760 MHz, thereby setting new distance records with the first QSOs between Hawaii and California on those bands.

In the first reflection of the impact of the code-free Technician license, 1991 saw a reversal in the downward trend of young people getting licensed. The overall U.S. ham population grew by more than nine percent over 1990.

1992

This was the year when the FCC gave itself the authority to issue very stiff fines, or Notices of Apparent Liability (NALs). In some cases hams were issued NALs in excess of $15,000! NALs were most often issued for deliberate interference to fellow ham operators, operating amateur radio equipment on CB frequencies or adjacent frequencies between the 10 and 11 meter bands and falsification of license applications.

Father Marshall Moran, 9N1MM, the missionary priest to Nepal, became a Silent Key, as did Don McClenon, N4IN, *CQ*'s 160 Meter Contest chairman, Hallicrafters founder Bill Halligan, W9AC, and *CQ* Hall of Fame member Al Slater, G3FXB.

Hams provided emergency communications following the devastation in Florida and Louisiana caused by Hurricane Andrew. Herbert Engleman, KD4OZY, lost his life when he was struck by lightning while helping to off-load supplies from a helicopter in the aftermath of the hurricane. Additionally, hams assisted in communications following Hurricane Iniki in Hawaii.

An era ended in 1992 as Heath left the amateur radio market after 37 years. Members of the Canadian Amateur Radio Federation and the Canadian Radio Relay League voted to merge their two organizations into one, to be known as the Radio Amateurs of Canada. Handi-Hams, an organization which helps individuals with disabilities to become hams, celebrated its 25th anniversary. And the ARRL briefly toyed

Sarah's Journal *cont.*

fan interviewed on TV called both groups "millionaire cry babies." The '94–'95 hockey season also isn't, also because of labor troubles. NHL owners locked out the players rather than face a strike after the season started.

There were no strikes or even boycotts at the Olympics. The 1992 Winter Games featured German athletes competing as a united team for the first time since 1936; and the athletes from the just-dissolved Soviet Union called themselves the "unified team" and competed under the Olympic banner. After the '92 games Olympic organizers switched the games to a staggered schedule in which winter and summer games would alternate every two years instead of having both every four years. As a result, there was a Winter Olympics in 1994 in Norway, and the next Summer Games will be played next year (1996) in Atlanta. Finally, the World Cup soccer championships were played in the United States for the first time last year. The "home field" advantage didn't help the U.S. team, though, and Brazil won the Cup.

What's ahead in the next ten years? Well, the turn of the century, that's for sure. But if technology continues to develop at today's pace—and I have no doubt that it will—I'm certain that by 2005 we'll be using devices every day that haven't even been thought of today, and familiar devices such as the telephone, television and computer will either look and act totally different, or be used in ways that will make today's "hi-tech" look absolutely primitive. I'll see you in cyberspace.

(Researched & Written by Richard S. Moseson, NW2L)

Information Sources
"Joe's Journal," "Sarah's Journal" (and related sidebars)

NW2L's note: Most historians consider the past 50 years as just too recent to be "history," and the history of technology has been poorly documented even when it was old enough. As a result, it was necessary to use a wide variety of sources for the information that went into these articles. Many events appeared in multiple sources, and sources sometimes disagreed about the same event. It therefore really is not possible to footnote my sources in the traditional way. Instead, what follows is an alphabetical list of all of my sources. If you'd like to learn more about the evolution of technology over the past 50 years, I particularly recommend the following (author/publisher informa-

with the idea of becoming the American Amateur Radio League; however, as with "His Master's Voice" on RCA products, tradition prevailed.

The big DXpedition of the year was the VP8SSI, South Sandwich Island operation. The November 1992 *QST* article subtitled it "The Most Awful Place in the World." Despite the adversity, the group was able to make more than 40,000 QSOs during its stay.

By 1992 hams in space were rather routine. Packet and voice operations during the STS-47 mission, in which Jay Apt, N5QWL, and Mamoru Mohri, 7L2NJY, were on board, netted over 5000 connects.

And on VHF, Gary Crabtree, KB8RQ, became the second ham to complete DXCC via EME and 2 meters.

1993

It became okay to order a pizza by autopatch in 1993. The FCC in July relaxed amateur radio's "no-business" rule, making it legal to use amateur radio to conduct certain business transactions (such as the infamous example of using a repeater autopatch to order a pizza). The new rule says most communications are okay as long as they don't relate to *your* business or your employer's business. Also in July, Novice class license examinations were brought into the Volunteer Examiner program.

Flooding was the name of the game for disaster communications in 1993. The overflow of the Mississippi and Missouri Rivers and their tributaries kept hams in the Midwest busy for several months. Flooding in San Diego County, California also required hams' assistance when the town of De Luz was completely cut off from the rest of the county. And in October hams provided emergency communications during the devastating fires that swept through parts of California.

Harold H. Beverage, ex-W2BMI, the designer of the antenna that bears his name, became a Silent Key in January, followed by Lenore Jensen, W6NAZ, in May. Known for her Hollywood connections, Lenore often promoted amateur radio, once being the subject of a Ralph Edwards "This is Your Life" broadcast. She was most remembered by the thousands of G.I.s (including this author) who ran phone patches through her station during the Vietnam conflict.

Jim Rafferty, N6RJ, extraordinary contest operator and vice-president of Ham Radio Outlet, became a Silent Key in June, followed by world traveler and DXer Lloyd Colvin, W6KG, in December. Lloyd and his wife, Iris, W6QL, traveled the world for nearly 30 years, making contacts with hams from more than 220 countries.

Richard Burton, ex-WB6JAC, was sentenced to $7\frac{1}{2}$ months in jail for again operating a station on amateur radio frequencies without a license. Burton had previously spent time in jail for a similar conviction.

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tion below): *Technology in America: a Brief History, The Timetable of Technology* and *The Timetables of Science*. I relied heavily on these books plus *The Cover Story Index*, the *Information Please Almanac* and the *World Almanac*.

Compton's Encyclopedia, Online Edition (Via America Online; various download dates), 1994.

Flatow, Ira, *They All Laughed . . . From the Light Bulb to Lasers: The Fascinating Stories Behind the Great Inventions that Changed Our Lives*, Harper Collins, NY, 1992.

Giscard d'Estaing, Valerie Anne, *The World Almanac Book of Inventions*, World Almanac Publications, NY, 1985.

Greenwald, Jeff, "Arthur C. Clarke on Life (and Death)," *Wired* 1.3, Wired, 1993.

Groisser, Philip L., *Mastering American History*, Keystone Education Press, NY, 1971.

Grolier's American Academic Encyclopedia, Online Edition (via CompuServe; various download dates), 1994.

Harper, Patrick, ed., *The Timetable of Technology*, Hearst Books, NY, 1982.

Hellemans, Alexander, and Bunch, Bryan, *The Timetables of Science: A Chronology of the Most Important People and Events in the History of Science*, Simon & Schuster, NY, 1988.

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Ham Radio History *cont.*

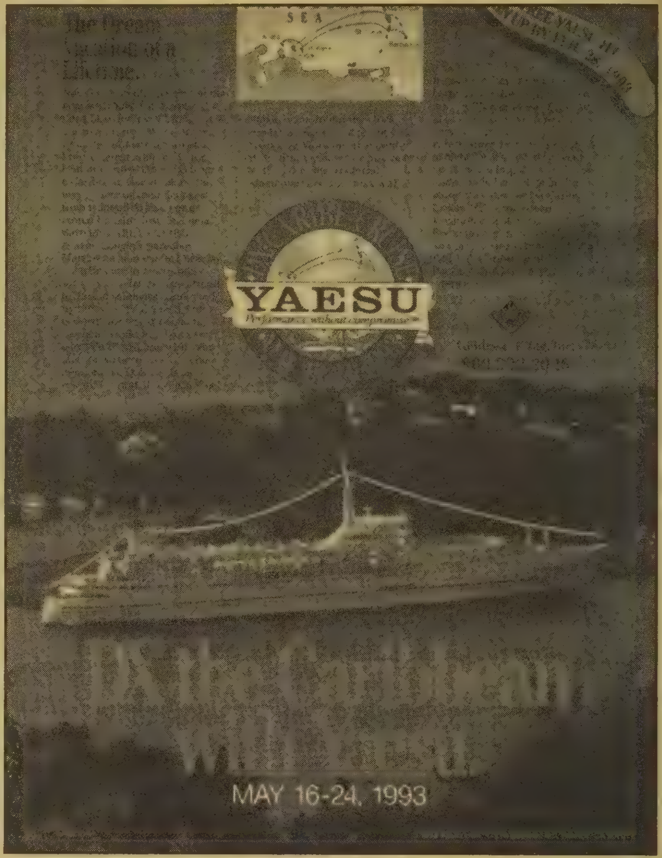
In another enforcement action, Jorge Mestre, ex-NS3K, was fined $50,000 and agreed to surrender his ham licenses after he was convicted of sending false SOS signals. In an unusual action the ARRL asked for and received his resignation from membership in the League.

In November the FCC dropped the station location block from amateur radio licenses. And in December it granted ARRL requests to create a weak-signal sub-band on 222 MHz and to extend the Novice sub-band there to cover the entire band. By the end of the year the FCC had proposed a "vanity call sign" program and instant licensing.

Yaesu USA sponsored a DXpedition cruise. Spokesman Chip Margelli, K7JA, said it was like conducting several Field Days during the cruise, as they had to set up and then, a few hours later, tear down ham stations at all of the ports of call along the way. Perhaps not atypical for a cruise, one couple, Howard Phillips, N6DEC, and Lori Ratzlaff, got engaged. They were married in October 1994, with Chip acting as best man and five others who were on the cruise also being present.

The 1993 Nobel Prize for physics went to Dr. Joe Taylor, K1JT, and Dr. Russell Hulse, formerly WB2LAV, for their discovery of binary pulsars.

In DX operations Bangladesh and Ghana resumed active amateur radio operations. Spotty at best over many years, both countries moved toward actively licensing their own citizens as hams. Several new countries were created out of existing countries. From the former Yugoslavia came Croatia, Slovenia, Bosnia-Herzegovina and eventually Macedonia. From Czechoslovakia came the Czech Republic and Slovakia. And from Ethiopia came Eritrea.



1994

Advances in technology seemed to make great strides during 1994. Hams found new uses for the GPS (Global Positioning System) satellite service. Hams also developed software for virtual instruments that use the computer to control a radio while watching reaction on screen. Interest in the Internet grew exponentially with articles appearing on how to access it and what was in store for hams once on it.

Among the DXpeditions, the February Peter I Island 3Y0PI

Sarah's Journal *cont.*

Information Please Almanac, Houghton Mifflin, Boston, 1990, 1991, 1992, 1993.

Marcus, Alan I. and Segal, Howard P., *Technology in America: A Brief History*, Harcourt Brace Jovanovich, San Diego, CA, 1989.

Mazour, Anatole G., and Peoples, John M., *Men and Nations: A World History*, Harcourt Brace Jovanovich, NY, 1975.

Morison, Samuel Eliot, *The Oxford History of the American People*, Oxford University Press, NY, 1965.

Murphy, Gerald, preparer, "M. L. King's 'I Have A Dream' Speech—Aug. 28, 1963," National Public Telecomputing Network, downloaded 1994.

Newsweek magazine:
"Cable TV Comes of Age," 8/24/81.
"Review of the 1960s," 12/29/69.
"The 60s, Decade of Man in Space," 12/14/59.
"The 70s, 10 Years that Shook America"; "Now, the 80s"; "Wonders of '89," 11/19/79.

Presidential Elections Since 1789—Third Edition, Congressional Quarterly, Inc., Washington, DC, 1983.

Skapura, Robert, ed., *The Cover Story Index, 1960-1989* (Cover stories from *Newsweek, Time* and *US News & World Report)*, Highsmith Press, Ft. Atkinson, WI, 1990.

Stevenson, Janet, "Rosa Parks Wouldn't Budge," *American Heritage*, 2/72.

The Magic Crystal . . . How the Transistor Revolutionized Electronics, AT&T Bell Laboratories, Hopewell, NJ, 1970.

Time magazine:
"New Products," 9/19/60.
"The Room-Size World," 5/14/65.
"1968," 1/11/88.

Todd, Lewis Paul and Curti, Merle, *Rise of the American Nation*, Harcourt Brace Jovanovich, NY, 1977.

US News & World Report magazine:
"A World of Communications Wonders," 4/9/84.
"Challenges of the '80s," 10/15/79.
"Changes in the Way You Will Travel," 7/2/79.
"How Your Life Will Change," 1975–2000, 3/3/75.

World Almanac and Book of Facts, The, Funk & Wagnalls, Mahwah, NJ (and previous publishers), 1950, 1960, 1970, 1980, 1992, 1994. ■

operation was extremely successful and well run, with many thousands of contacts being made.

Cuba found itself in amateur radio news several times during the year. In February this author met with Pedro Rodrigues, CO2RP, the President of the Federacion Radioaficionados de Cuba, during a Methodist church mission trip to Cuba. That led to a joint U.S.-Cuban operation during the ARRL June VHF QSO Party.

Also in June, a group of Cubans, supposedly including one ham, Juanito, CO2PJ, commandeered a vessel and headed for the U.S. En route, the group came under attack by a Cuban gunboat, and some of those on board were wounded. A Mayday broadcast from the commandeered boat was received in Florida. Hams in Florida, Puerto Rico and Panama kept in contact with the craft until it reached U.S. control.

Hams also provided emergency communications following the Los Angeles earthquake, the Georgia floods and other disasters around the country.

In the summer the National Telecommunications and Information Agency (NTIA) dropped a bombshell by declaring that 200 MHz of spectrum in the microwave bands could be auctioned off by the FCC once the frequencies were released from use by the Department of Commerce. Of concern to hams was that major portions of the 2.3 GHz band (a shared band on which amateur radio is a secondary allocation) were included in the group of frequencies. The ARRL, AMSAT, the Central States VHF Society and others immediately mounted a defense of this band, each with its own particular interest in preserving it for amateur use. Because the band is available to hams on a secondary basis, the groups were (and are) concerned that any new primary user might find it necessary to severely restrict hams' access to it.

The first of the FCC auctions took place in August. Although not including the 2.3 GHz amateur band, hams did receive a "wake-up" call of sorts when it was disclosed that the bidding netted the government over $680 million. In November the FCC issued a Notice of Proposed Rulemaking (NPRM) asking for input on the usage of the frequency spectrum of the 2390–2400, 2402–2417, and 4660–4685 MHz bands. The FCC asked what use potential users might have for these bands, noting that moving the hams off the 2390–2400 MHz band could cause "serious disruption" to the amateur satellite service. As of the end of the year, comments on the NPRM were still being solicited.

In October the U.S. Congress passed a joint resolution that urged the FCC to provide "reasonable accommodations" to the amateur radio hobby in the operation of ham radio from homes, automobiles, and public areas.

By December the FCC was planning to accept electronically transferred applications for ham licenses. The FCC announced that with electronic transfer the turn-around time for applicant to licensed ham should be reduced to about ten days (from a high of as much as four months). With this change in effect, the proposal for "instant licensing" appeared moot.

The FCC was scheduled to examine the issue of "vanity calls" at its December meeting. A decision is expected early this year. Also still pending is the 219–220 MHz frequency allocation. Again, FCC action is expected early in the year.

1995

Amateur radio in 1995 bears about as much resemblance to amateur radio in 1945 as does a racing car to a horse-and-buggy. AM is virtually extinct, as are vacuum tubes.

→

Feenix, Ariz.

Deer Hon. Ed:

It been menny menny years since I right too you, but I here *CQ* is having big berthday partee and I wanting you too no I am still alyve and kicking. I try too stay acktiv on ham bands, two. I liking too listen too repeeters on two meters, but found it much eezier if you hook up radio too the meters. I unnerstand, thow, why they called "repeeters," cauze it seem I heer the same old stuff repeeted over and over.

Now, I heer on repeeters about pocket radio, and pocket bulletin boreds. Not making much cents too me. I have trubbel putting my keys in my pocket; can't imaginn hole bulletin bored. Anyway, I tried pocket radio. It OK, but werks much better when I take it out of my pocket. I don't see whut's the big deel.

Next thing I heer on repeeter is all about code-free ham license. This sound real good too me, since I am always catching codes. So I go down too efceecee, and they tell me I have too go too VE team. Can't unnerstand why I have too go too Kanada for USA ham license. Finally found hams here in Hon. Yewnited States who give license tests. I tell them I want no-code license, but they say I already have code. I say I come back wenn I'm helthee. Then they say no, I donut unnerstand—I can't get no-code license cauze I already have extra license. I say no, this is the only license I have. But they insisting its extra license. So I ask man behind me in line if he want my extra license so I can get no-code license. He starting too explane that with no-code license, yew can onlee opurrate when yew donut havv a code. Butt then the test peepul start yelling if I give man behind me my extra license, they send me too efceecee. I say no need too doo that, since I allreddy went too efceecee and they sent me too Kanada.

I telling yew, ham radio getting very confoosing, suspeshully for old man like mee.

So hapee berthday and mebbe I see yoo on the hair.

Respectively yours,
Hashafisti Scratchi

Ham Radio History *cont.*

Ham radio's tradition of building and tinkering is endangered. The technology that makes our radios work has gotten too complex—and the parts too tiny—for the average ham to do much tinkering. Yet we are the world's only spacefaring hobby. We build our own satellites and control them once they are in orbit. Amateur packet radio networks are the model on which the business community has built the "wireless LANs" that are becoming so popular today. And ham radio is still counted on to get through when all other means of communication fail.

Our hobby is almost totally different today than it was a half century ago. Yet it is as vibrant, as modern and as exciting as ever. The technology will continue to change, but amateur radio will survive as long as it sticks to its basic tenets of public service, experimentation and international goodwill.

(This author would like to thank Lew McCoy, W1ICP, Chip Margelli, K7JA, and Chris Imlay, N3AKD, for their input. I would also like to thank the Aeronautical Center Employees Amateur Radio Club, W5PAA, and members of QCWA Chapter 63 for the loan of back issues of QST*. Finally, I thank you, my fellow hams, for being the players [so that I can have something to write about] in this wonderful hobby of ham radio.)* ■

Amateur Radio: The Next 50 Years

By Bryan P. Bergeron, NU1N

Fifty years ago "state of the art" in amateur radio meant vacuum tubes, discrete components and vernier dials. Sputnik was still a dream, and the transistor hadn't been invented. What amateur in 1945 could even have imagined today's computer-controlled HF rigs, pocket-sized handhelds, packet radio or a fleet of amateur satellites?

Given the incredible evolution that amateur radio has experienced in the past 50 years, what advances can we expect during the next 50? Although it's impossible to accurately predict the discovery of new technologies, it's exciting to explore the limits and promises of known technologies and fantasize somewhat on the role they might have in the metamorphosis of amateur communications.

Through the next decade it's safe to assume that we'll enjoy more compact, lighter, more affordable equipment, with increased functionality, thanks to advances in microprocessors, ICs and software technologies. Given the enthusiasm surrounding the multimedia services available through the Internet and elsewhere, it's inevitable that RF communications using voice combined with still images and digital video sequences will become the norm. The Dick Tracy wrist communicator, with video and voice communications, perhaps with links to a global positioning (GPS) feature, is inevitable. Of course, the widespread interest in video and other high-bandwidth communications, together with more congestion in the VHF bands, should accelerate hams' migration to microwave frequencies and beyond.

Miniaturization and other evolutionary changes in amateur communications, in light of lifestyle trends, will one day make the concept of a "ham shack" obsolete. As an increasingly mobile society, our computers, communications equipment, and other personal tools must move with us to be useful. Even today there are many amateurs who can't find the time to work HF DX but can manage to exchange greetings via two meter handhelds and work with their laptop computers on their daily commute. Similarly, the workbench of the future is likely to take the form of a desktop computer that allows the user to experiment with various digital signal processing (DSP) algorithms. Why work with a soldering iron when you can use software to design and customize any electronic communications device you might want?

Looking ahead 20 or 30 years, given the current rate of change, the very nature of our personal communications will be quite different from the current exchange of verbal or coded greetings. Research in telepresence and virtual reality will ultimately yield technologies that will allow us to personally visit our contacts, using remotely controlled robots with steerable cameras and tactile sensors, plus data gloves with tactile feedback. We'll be able to look at, see and even touch our contact's rig, take a look around the room, move to a window and look out at the weather and perhaps even get a sense of his or her neighborhood. A DX contact will come to mean much more than a QSL card from a distant ham. Through virtual reality each station operator will be able to visit a foreign land and experience the environment first-hand.

Looking further into the future, and borrowing from a few popular science-fiction movies, one could envision being able to communicate our objective experiences through virtual reality body suits. That is, the sights, sounds, temperature and tactile sensations experienced by the wearer of one suit could be transmitted to the wearer of another. Imagine "tuning" the bands and joining an amateur sailing the Mediterranean, hiking in the Rockies or driving through Germany. What about peering through OSCAR 99's onboard camera system, directing the view with a turn of your head or a twist of your hand? Or experiencing a view from the perspective of an amateur-astronaut standing on the observation deck of a future space station?

The bandwidth requirements for sending all of this data would be incomprehensible to today's amateurs. Just as we look back in disbelief at the original PCs being useful with only 64K of memory, we will one day wonder how anyone could possibly make due with less than 100 MB of bandwidth. Part of the bandwidth solution will undoubtedly come from new data compression algorithms, together with alternative communications media, such as networks of communications satellites.

Extrapolating the achievements in molecular genetics, an amateur radio 50 years in the future may be more reliant on biologic mechanisms than on conventional silicon-based electronics. By the year 2045 biomedical implants, synthesized with the help of human-engineered DNA, may make virtual reality body suits and other external signal transducers unnecessary. Through these biological implants, we'll be able to experience a selective telepathy of sorts, communicating our conscious thoughts and emotions. After all, isn't this the ultimate form of personal communications?

Of course, this is just one amateur's perspective. What the future holds ultimately depends on our collective willingness to push the envelope of personal communications to new horizons. What horizons do *you* see in our future?

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DOUG'S DESK

BY DOUG DeMAW, W1FB

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORYs

Technical Advances—The Past 50 Years

The face of amateur radio has changed markedly since 1945, owing to technological advances and changes in amateur radio operating priorities. But perhaps the most significant difference from then to now is the increasing trend away from the technical aspects of our pastime.

Technical discussions heard on the airwaves today are centered around the frills and outward performance of the factory-made gray or black boxes. Little is said about the circuit design, receiver dynamic range, phase noise, or the countless other circuit advances that brought amateur radio out of the Dark Ages.

Conversely, 50 years ago, and before and after 1945, most discussions focused on home-made equipment, circuit innovations, new amateur designs, and ways to extract better performance from then standard circuits. Most amateurs were technically skilled, at least in a moderate sense. The products from home workshops were exciting. In many instances the design work of nonprofessional amateurs was copied by commercial entities and made available in store-bought form. Our nation not only had a pool of qualified operators in time of need, but could draw also on the technical skills and expertise of amateurs.

Today only a small percentage of the licensed amateur population has the courage to look inside the equipment cabinet, let alone attempt repairing a faulty rig. Almost without exception the defunct transceiver or station accessory item is put into its "original factory carton" and shipped to an authorized repair agency for service. In the past, home-made gear was always serviced by its owner and was usually back on the air in less than a day. It's debatable whether or not our present amateur way of life is better or worse than it was five decades ago.

Modern Gadgets

SWR indicators were seldom seen in amateur shacks in the '40s and early '50s. RF ammeters were generally placed in the feed line near the transmitter and antennas were adjusted for maximum current flow. In a like manner, antenna tuners (now called Transmatches) were adjusted for maximum feeder current, which generally coincided with an SWR of 1:1.

Another popular technique of the past was to tune the transmitter pi network tank for resonance and proper loading into a 50 ohm dummy antenna. The TUNING and LOADING control settings were written down, and the antenna tuner or antenna was adjusted so that the same plate tuning and loading settings obtained with the dummy antenna were secured. This indicated a 50 ohm match. Today it is not unusual to hear amateurs express concern if they note an SWR of, for example, 1.5 to 1. The operator may readjust his antenna tuner during a QSO and say, "There, the SWR is now 1:1. Is my signal louder?" In truth, there would be no discernible signal increase in the HF band. Some modern gadgets have made worriers of many operators needlessly.

Today we have keyboard keyers and electronic keyers with memories for CW operation. CW decoders permit displaying the CW message on a CRT, and it is possible to send and receive, say, 80 wpm without knowing a letter of the Morse code. Fifty years ago we used straight keys, sideswipers, and bugs for sending CW. You could recognize an operator, even if you did not hear his callsign, by his distinctive "fist." Electronic CW generation has taken the personality out of CW operation. On the plus side, keyboard keyers, especially, provide clean, readable CW that can't be butchered by an operator with a poor fist!

Frequency Stability Improved

AM was king 50 years ago. Owing to the wide receiver bandwidth needed for "broadcast quality" AM reception, a slightly drifting VFO was seldom detected. A great many operators used crystal control in those days, even at 160 meters. It was common to hear someone say, "CQ CQ CQ. This is W8HHS calling CQ 10 meters and tuning the entire band for any possible call." In those days few amateurs had crystals for the same frequency, so tuning the band for an answer to one's CQ was a normal practice.

VFOs were somewhat rare, and they were usually home made. Acceptable performance depended in large measure on the availability of temperature-stable capacitors for the VFO tuned circuit. Vacuum-tube heat was the ever-present enemy of stability. Silver-mica capacitors were the least costly and most available high-Q capacitors then. They did not approach the temperature stability of modern NP0 ceramic capacitors, so it was necessary to try several units of the same value in an effort to find one that was more stable than the others. Large Miniductor types of tank coils were used in early-day VFOs in order to obtain high Q and good mechanical stability. It was not unusual to see a single-band, home-made VFO that was nearly as massive as the transmitter with which it was used. Today we expect frequency drifts of less than 100 Hz from a cold start to full stabilization an hour or less later. Synthesized local oscillators exhibit virtually no drift from a cold start to many hours later. Old-time VFOs were capable of drifting a few kilocycles in 30 minutes if care was not exercised in the design and layout of the circuit.

Equipment Size

The bigger the better in the old days. Those who could afford to use high power were nobodies unless the transmitter was contained in a 6 foot relay rack. Separate power amplifiers were seldom used. Rather, the 500 W or 1 kW final stage was a part of the transmitter, replete with a screened or glass panel window that allowed the operator to observe the color of the tube anodes, cherry red being the normal color at full power. One deck in the rack contained the modulator, and there were normally two decks that held large power supplies—one for the PA stage and one for the modulator. An antenna tuner was sometimes added as the top deck of the massive collection of chassis. The exciter (often a Meisner Signal Shifter) sat on the operating desk. Plug-in coils were used when changing bands with the transmitter, and the earlier models of Signal Shifter also had plug-in coils. Plug-in coil assemblies were used also in National HRO receivers, which were popular then. The bluish glow of the 866 mercury rectifiers could be seen on the wall behind the relay rack, and many of us would judge our modulation percentage by observing the intensity of the bluish glow as it varied during a voice transmission.

High power was more the exception than the rule 40 or 50 years ago. Many of us used as little as 25 or 50 watts at the home station, and that enabled us to work

---

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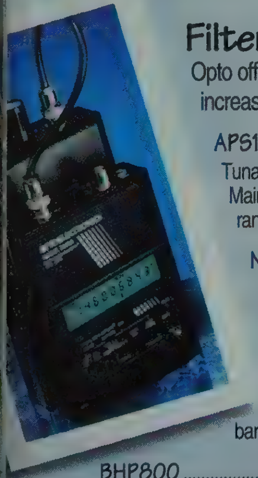

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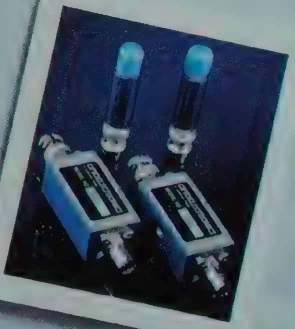

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as much DX as we wanted. The "dog eat dog" power syndrome scarcely existed back then. Prior to the appearance of the 6146 tube, most hams used 6L6s, 807s, 815s, or 814s in the final stage of their transmitters. When television entered the scene in the late '40s, the 6BG6 horizontal output tube became popular with hams as an RF amplifier that was comparable to an 807. Many HF-band mobile transmitters used the low-cost 6AQ5 audio tube as the last stage in the transmitter. It was common practice to work stations 100 miles or more distant on 160 meters with an 8 W, 160 or 75 meter AM mobile transmitter that was equipped with a base-loaded 8 foot whip.

Compact gear is the order of the day now. I confess that I prefer the smaller, cooler-operating modern gear. Certainly, the power bill is substantially less without those current-hogging filaments burning when I am on the air. Receiver selectivity is excellent today, as are the frequency stability and readout resolution. It's a far cry from the days when receivers had 5 kHz readout resolution, at best, such as with the old National NC-183 receivers.

Operating Conduct

Notable among the differences between the old days and today is the decorum of operators. Hams were gentlemen 40 and 50 years ago, with a few minor exceptions. Hard language, obscenity, off-color jokes, racial and ethnic slurs, and outright profanity were not heard back then. Deliberate QRMing was virtually unheard of, and if you slipped and said "hell" on the air you were afraid to open your mail for fear there would be an FCC pink ticket for you to answer. Today's ungentlemanly on-the-air conduct is obviously a product of our permissive society, and has not necessarily been spawned by the amateur radio society. It is a sad testimonial to what the current amateur radio body is forced to accept as the norm.

In Summary

Amateur radio is alive and well in 1995, but it scarcely resembles the pastime as we knew it 50 years ago. Emphasis is on operating, contesting, DXing and repeater use. The technical curiosity of the hobbyists seems sadly lacking, and it is unlikely that this will change. The thrill of building one's own equipment and working stations around the world with something that was constructed and honed to perfection at home has been lost in a wave of nostalgia. But then, having been in this game for so many years makes me a dinosaur. Nonetheless, there are some wonderful amateur radio memories from the past.

73, Doug, W1FB

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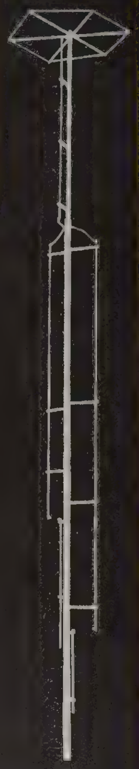
We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.

Eagle DX

Challenger DX


Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

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A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

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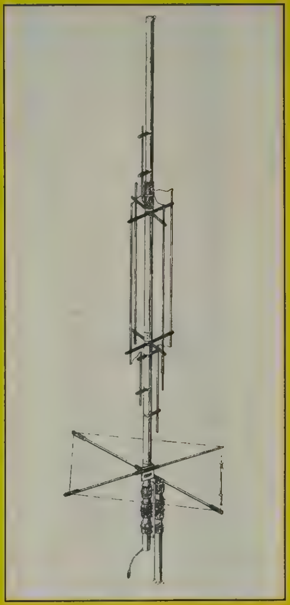
RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

New Release: TITAN DX



This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

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Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$269
Titan DX Just Released			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$289
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

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Fifty Years of VHF Plus Activity

VHF PLUS CALENDAR

January 1	New moon. Very poor EME conditions.
January 3	*Quandrantids* or *Quads* meteor shower: Predicted peak: Either 0038 on 3 January or 0052 on 4 January.
January 8	First quarter moon. Moderate EME conditions.
January 11	Apogee.
January 15	Very poor EME conditions.
January 16	Full moon.
January 22	Good EME conditions.
January 22–24	ARRL VHF Sweepstakes, 1800 UTC 22 January to 0300 UTC 24 January.
January 23	Last quarter moon.
January 26	Perigee.
January 29	Very poor EME conditions.
January 30	New moon

In honor of the celebration of *CQ*'s 50th anniversary, your columnist will take a look back at the firsts that occurred on the VHF Plus ham bands over these past 50 years. These years have been marked by firsts for a particular mode of propagation and firsts for a particular band. In order to cover the history of the past 50 years, it is necessary to cover some of the firsts for the VHF Plus bands that occurred before 1945.

Actually, the VHF Plus frequencies have played a vital role throughout the history of communications. The first detection and measurement of radio waves occurred in 1887–88 when Heinrich Hertz experimented with parabolic dishes that produced waves at about the 30 cm wavelength, or one gigaHertz!

In the history of amateur radio VHF propagation, however, tropospheric enhancement was the first mode to be discovered. As early as 1931 tropospheric scatter was recognized as a form of propagating signals on the VHF amateur bands. Approximately three years later tropospheric refraction was discovered as a form of propagation. Ross Hull wrote an article in June 1935 *QST* explaining why signals on the 5 meter band could travel beyond the line of sight, citing tropospheric refraction as the mode that carried that signal farther than one could see.

Tropospheric ducting across water really got a boost when in 1957 John Chambers, W6NLZ, and Tommy Thomas, KH6UK, made contact on 2 meters. Two years later they again made contact, this time on 220 MHz. Experimentation continued to take place along this path with contacts being made between Lou Anxiaux, (then) WB6NMT, and Paul Lieb, KH6HME, on 432 in 1979, with Paul and Chip Angle, N6CA, on 1296 MHz in 1984, again with Paul and Chip on 3456 and 5760 MHz in 1991, yet again with Paul and Chip on 902 MHz in 1993, and finally again with Paul and Chip on 2304 MHz in 1994.

About a year later, following the discovery that signals were being reflected back to earth from layers of the "ether" or atmosphere, sporadic-E became known as a form of propagation for VHF. Amateurs on the old 5 meter band discovered how it was possible to make contacts in excess of 1000 miles, and even determine what time of year was best for this form of propagation.

When amateurs were assigned the 6 meter band, right away they were using sporadic-E propagation. It would be nearly four years later before a contact would be made on 2 meters. In June W5VY and W8WXV completed a two-way QSO after reception reports by W5KL and W1JQA indicated that this mode might exist.

It would be 37 years later, again in June, when the first two-way QSO on 220 MHz took place. Described as probably the best weekend ever in terms of sporadic-E QSOs (it was the weekend of the ARRL June VHF QSO Party), the bands were hot! Bill Duval, K5UGM, and John Moore, W5HUQ/4, had completed a contact on 2 meters when they decided to try it on 220 MHz—and complete they did!

VHF plus amateurs, being what and who they were (experimenters), tried reflecting their signals off whatever they could find that would reflect them. It was about four years after sporadic-E was discovered when aurora was determined to be a reflector of radio signals.

Perhaps the most spectacular in terms of discoveries of modes of propagation, however, was meteor scatter. Long suspected because amateurs had heard pings of signals from distant amateurs on the old 5 meter ham band and on 10 meters, amateurs did not experience two-way contacts until 1946. It was on the night of 9 October 1946, the night the *Giacobinid-Zinner Comet* and its associated meteoroids were making their predicted rendezvous with earth. What was not predicted, however, was the associated effect the meteor vaporization would have on the VHF amateur bands.

Amateurs had experienced the sounds of bursts of reception from distant stations during meteor showers. It was then called the "shooting star" effect.

The 6 meter amateur band had only been assigned since May, and hams were eager to establish records and generally see what the amateur band could do in the way of propagation. Because of this curiosity, the familiarity with the "shooting star" effect, and the publicity surrounding the then forthcoming meteor shower, there was a lot of anticipation as to what might occur during that October night. Both amateur observers and hams were eagerly awaiting the effects of the shower.

In all, the propagation lasted for around three hours. Most of the reports came from the east and the midwest portions of the U.S. For the first time in the history of ham radio meteor scatter was used for signal propagation.

From this beginning meteor-scatter-caused propagation became a part of the VHF operator's repertoire of communicating. However, it wasn't until 1953 that a 2 meter contact via this form of propagation would take place.

In June 1953 Paul Wilson, W4HHK, and Ross Bateman, W4AO, were in contact with each other via a tropo path. After the tropo path fell apart, Paul continued to hear bursts of signals. Ross advised Paul that what he was hearing were meteor bursts. Within a few days of this contact Paul got a letter from Ralph "Tommy" Thomas, W2UK, asking to set up schedules for a possible 2 meter contact via any mode of propagation. In Paul's answer he indicated a desire to try to work him via meteor scatter.

Over the next several months schedules were set but with no success until October of that year. On the morning of the 22nd it all fell together when Tommy copied more than 2 minutes of transmission from Paul, and he in turn was able to copy Tommy's confirmation and signal report. With that exchange they had the first complete 2 meter QSO via meteor scatter.

It would be another 15 years before a meteor-scatter contact would be made on 220 MHz. During the *Perseids* meteor shower Mel Baer, W6WSQ, and Don Hilliard, then W0EYE, completed a contact on that band. Two days later a second contact was made, this time between K4IXC and K2CBA. After the word was out several more tried and were successful.

Four years later, again during the *Perseids* meteor shower, Carl, W2AZL, and John, W0DRL, made the first 432 MHz meteor-scatter contact. To date no meteor-scatter contacts above this band have been completed.

In the same year that meteor-scatter propagation was used for the first time on 6 meters, F-layer propagation was also discovered to reach 6 meters. Experiments on the old 5 meter band had yielded some reception reports as early as 1937. But it wasn't until 24 November 1946 that a two-way QSO between Grid, W4GJO, and W6QG took place. To date no F-layer QSOs have taken place above 6 meters.

Related to F-layer propagation is trans-quatorial propagation. As interest in DX on 6 meters increased, so did discovery of different modes of propagation. In November 1947 sta-

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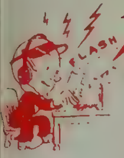

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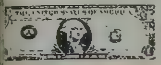

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More than sixty VHF weak signal enthusiasts attended the charter meeting of the Western States Weak Signal Society. (Photo courtesy KC6WLC)

tions in South America began to be worked by stateside stations on a pretty regular basis. In 1979 a contact between I4EAT and ZS3B on 144 MHz scored the first QSO on this band. Four years later a contact between KP4EOR and LU7DJ tallied the first QSO on 220 MHz.

Right alongside F-layer propagation came back-scatter propagation. Stations operating on 6 meters discovered the effect of this scatter mode during intense F-layer openings. Ionospheric scatter also was found on 2 meters. Known as Field Aligned Irregularities, or FAI, this mode of propagation had been known about in the early 1950s. However, Tom Kneisel, K4GFG, and Dave Ternent, KP4EOR, completed a contact in 1978 that they later determined to be FAI. That QSO opened the door to more research in that mode on higher VHF frequencies. However, to date no QSOs on higher frequencies have taken place.

Incidentally, substantially well-equipped stations have discovered that through ionospheric scatter 6 meters is never closed. Contacts can be made by literally "forcing" the signal along the scatter paths.

Perhaps the most exotic mode of propagation on the VHF Plus bands is via the moon, or EME. In January '46 Herb Kauffman, W2OQU, and a group from Evans Signal Laboratory experimented with hearing their own echoes from transmissions to the moon on 111.5 MHz. However, the first amateur radio contact did not take place until 1960, when a group from Eimac, using Hank Brown's call, W6HB, worked a group from the Rhododendron Swamp VHF Society using Sam Harris's call, W1FZJ, on 1296 MHz. Over the years contacts have been made on each of the VHF plus bands, up through 10 GHz. In 1964 it was KP4BPZ and W1BU making the first 432 contact. In 1970 both the 220 MHz and 2304 MHz bands saw EME QSOs with WB6NMT and W7CNK making the 220 MHz contact and W4HHK and W3GKP making the 2304 MHz contact.

In 1972 W5WAX and K5WVX on one end and WA5HNK and W5SXD on the other end made the first 6 meter contact. In 1987 W7CNK and KA5JPD teamed up to work WA5TNY and KD5RO twice, once on 3456 MHz and once on 5760 MHz. A year later K5JL and WA5ETV worked each other on 902 MHz. Also that same year WA5VJB and KF5N worked the WA7CJO and KY7B team for the first 10 GHz contact.

Other VHF Plus firsts: The first amateur satellite was launched in 1961. The first two-way contact with a space vehicle took place in November 1983 when Owen Garriot, W5LFL, was in orbit on board the Shuttle *Columbia*. The first DXCC on VHF was achieved by Lee Fish, K5FF, in 1990. The first 2 meter DXCC was achieved by Dave Blaschke, W5UN, also in 1990.

As you can see, much has happened on the VHF plus frequencies over the past 50 years. And, experimentation like yours will continue to make things happpen on these frequencies over the next 50 years and beyond.

I am much appricative of Emil Pocock, W3EP's book, *Beyond Line of Sight*, for information regarding the history of VHF. If you have an interest in VHF history, this is an excellent book. (It is available from the ARRL for $12.00, plus $3.00 shipping.)

New 5760 MHz Over-Land Record

The tropo conditions between Texas and the Midwest were somewhat unexpected. Nevertheless, when word of the conditions causing a VHF plus opening over the weekend of 11–12 November became known, the guys were out listening.

Among them were Al Ward, WB5LUA (EM13), and Ron Stefanskie, W9ZIH (EN51). Each had a feeling that the tropo-enhanced conditions were extended above 1296 MHz, where lots of contacts were being made. They tried 5760 MHz. At 1645 on 12 November they completed a CW QSO, thereby extending the over-land distance to 738 miles.

My thanks go to Al's son, Bryan, N5QGH, who confirmed the information for me in the absence of his father, who was on a business trip, and to John Godwin, KB5IUA, who alerted me to the record breaker. While not setting any records himself, John did work dozens of stations on 2 meters through 23 cm in several new grids during the opening.

Twenty Record-Breaking Grids

As reported before, Randy Simons, N0LRJ, and his son, Ryan, N0UVA, activated a record 20 grid locators during the ARRL September VHF QSO Party. The following, taken from the "Rocky Mountain VHF+" newsletter, and written by Randy, explains how they did it.

"**Rover Smitten! Snake Bitten?** Who would have thought that a rattlesnake could be large enough to block a road? Here I was in the middle of almost nowhere in DM88 with the largest Diamondback in the western U.S. coiled in front of the car and ready to strike. The car seemed suddenly so small. The body seemed beer-can thin. I rolled the car forward. Surely, he'd give way and let me pass. Maybe it's the antennas all Medusa-like covering our jeep.

"'Don't get too close, Dad!' Ryan, N0UVA, was now leaning forward for a closer look. I edged the car towards the snake. Now three feet away we were eye to eye. Those serpentine eyes were intense, defiant, and holding their ground. I rolled down the window. 'Dad, you're going to get bit!' Ryan was squirming in his seat. The log book slipped to the floor. In the setting sun the snake seemed to glitter, a golden glow bouncing off his shiny scales—so defiant, deadly, and so beautiful.

"'Well, Ryan, we are 3–4 hours behind; we're never going to make it' I said. The contest had started at noon. We began at Panorama Point, Nebraska, and despite our good location, the highest point in Nebraska, we had few takers. I was looking to make as many contacts as possible in a short time from each grid. Finally after almost 2½ hours we had a few contacts on all five bands, and we left DN81 in Nebraska and neighboring DN71 in Wyoming. We headed south, feeling an urgency we hadn't felt before.

"This was the last contest that Rovers could multiply all contacts in all grids. From now on the new rules would take effect. The 'W3EP rules' they have been called. Can you imagine having your call attached to the changes that will do so much harm to roving, rules that will totally wipe out this most romantic and exciting part of our sport? *Webster's Dictionary* defines *rove* 'to ramble, to range, to go from place to place, especially over an extensive area.' And a *rover* is 'a wanderer; one who roves.' The new rules will slow us down, drain all wanderlust and adventure (and rare grids) from our contest odyssey. Why? Why?

"A few complained of those high-scoring rvers; maybe a rover or two took liberties with the rules. And so now the rover class exists in name only. Its competitors will be confined to the fringes of urban America within sight of concrete, asphalt, and skyscrapers if indeed not on them. Now roving is a bird in a gilded cage. It can fly no more. Why, now, should a rover improve his station? Why should he venture money, time, miles, and risk to actually lower his score? Why?

"'We're behind schedule,' I mumbled, realizing this was my last Rover dance marathon, and I wanted to go out in style. It takes a Rover at least 90 minutes to cross a grid square north to south and a lot longer east to west. 'This contest will be my statement,' kept going through my mind. The most number of grids ever activated by a rover is 16 (as reported by *QST*). I had spent hundreds of hours in building rover

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antennas, in equipping my little Samurai for a Baja-race-like ordeal, in planning this last big one. I wanted to prove that with a state-of-the-art setup one could *effectively* activate more grids. My previous best had been 11 grids, but my goal was not just to activate a grid with a contact or two, but to work as many stations as possible on all five bands. I knew that I would be the *only* station activating most of these grids. I wanted the single ops and multi-ops from the mountains to the Missouri river to appreciate what rovers have done, and can do, and will do more, if they want to be competitive.

"In the dark of a star-lit Colorado sky we headed south. I was starting to doubt the possibility of activating more than 16 grids. We headed for DM77 and 87, and realized we wouldn't be there until 1 or 2 AM local time. Would someone, anyone, stay up to work us there? I stopped briefly and explained the situation to Doug, W2CRS, and Ken, N0YGM. Could they hold off sleep that long? Yes! We headed south, determined to get to our ninth and tenth grid! To my surprise and great delight, we had four stations to work in DM77 and DM87; we worked W2CRS, N0YGM, and KD0DW on all five bands and N0QCN on 144. Afterwards—it was almost 3 AM—we began our all night 200 mile journey east to Dodge City, Kansas, for a new grid line to work, heading north.

"Almost out of gas, we pulled into La Junta and luckily found a 24 hour gas station. I turned the wheel over to N0UVA, who had been napping all afternoon. He would be the difference between reaching our goal or not. I had been driving and working the radios now for 19 hours straight. Ryan is 17 years old and had never operated a stick shift and clutch. I gave him drowsy instructions, coached him from first gear to fourth, and fell asleep.

"One hour later I was jolted from my sleep by a violent, jerking motion. Had we crashed? I was seeing something red. Was I bleeding? Where was Ryan? My eyes began to focus on a nightmarish scene. Ryan was cursing and very upset. We had come to a red light at the edge of La Mar, Colorado, and Ryan could not get the car going smoothly again. Every time he let out the clutch, the car lurched violently forward and died. 'Gentle, Ryan,' I said. 'Let it out slowly and very gently.' The car moved forward again, and we headed east toward the soon to be rising sun, still hours behind schedule. I slept.

"One hour later I again awoke to a startling motion. We were rocking side to side. Ryan said, 'Dad, you better take over. I'm getting tired, and the wind is really blowing hard.' The wind was coming from the south and blowing at least 50 MPH. Ryan, not used to driving an antenna farm through strong winds, had worn himself out with a vise grip on the steering wheel. I felt somewhat refreshed after two hours of sleep. We were still 90 minutes from our starting point in Kansas, there was a beautiful sunise, and I had a fantastic tail wind for driving north.

"We operated from DM97 and EMO7, hearing a din of CQing on 144.200 from Kansas City, Wichita, Oklahoma City, Tulsa, Denver, Texas, New Mexico, Nebraska, and elsewhere. What a great location! But we had trouble breaking through the QRM and worked few of the stations heard, about 25 contacts in each grid, then headed north. I ignored the southern boundaries of EM09 and DM98, but headed north. I did not want to miss the tail wind that was now sailing us north, pushing us up hill in fifth gear at almost 70 MPH! Could we get to four more grids and tie the record? We stopped at the top of EM08, working N0LL and KD0DW on all five bands and several others, then did the same in DM98. Six meters was trying to open, and we made a few contacts while driving. I was beginning to think we might not only get to over 16 grids, but have a respectable score, perhaps exceeding N0KV/R's division record from last year of 43,818 points. As I headed north again, I remembered a remark at Dayton during one of the rover debates: 'Rovers cannot score well by working too many grids anyway because they don't have enough airtime.'

"With a tail wind we were beginning to make up lost time. The antennas were sails. And so far no car trouble, blowouts, or anything. We crossed the state line into Nebraska and operated from EN00 and DN90, and then in DN91 and EN01, scoring well as a host of stations were tracking us as though we were on radar. We also made some 6 meter E-skip contacts. Those closing minutes of the contest in DN90 were like finishing a marathon. We had done it! Tired, hungry, grungy, but elated—we had activated 20 grids, traveled 1339 miles, and (we figured out the score later) scored over 175,000 points!

"Roving has been a creative, challenging and exhilarating adventure for me, giving not just me the thrill of new goals and accomplishments, but providing stations that worked us contacts and grids and high scores that they otherwise would not have had. Many have told me that a third or even half their contest score was from working me! Only 7 of the 20 grids

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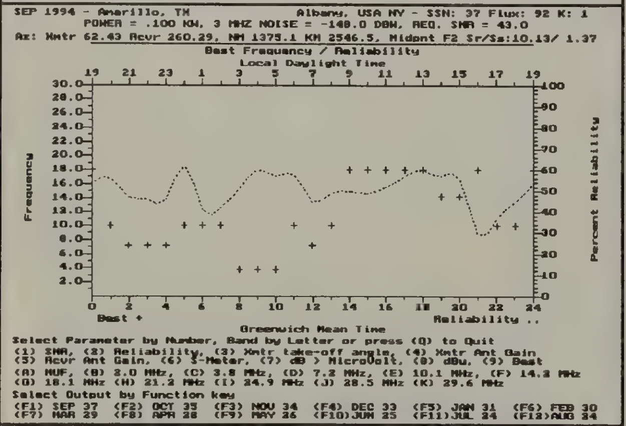

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SEP 1994 - Amarillo, TX                Albany, USA NY - SSN: 37 Flux: 92 K: 1
        POWER = .100 KW, 3 MHZ NOISE = -148.0 DBW, REQ. SNR = 43.0
Az: Xmtr 62.43 Rcvr 260.29, NM 1375.1 KM 2546.5, Midpnt F2 Sr/Ss:10.13/ 1.37
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Select Parameter by Number, Band by Letter or press (Q) to Quit
 (1) SNR, (2) Reliability, (3) Xmtr take-off angle, (4) Xmtr Ant Gain
 (5) Rcvr Ant Gain, (6) S-Meter, (7) dB > MicroVolt, (8) dBu, (9) Best
 (A) MUF, (B) 2.0 MHz, (C) 3.8 MHz, (D) 7.2 MHz, (E) 10.1 MHz, (F) 14.2 MHz
 (G) 18.1 MHz (H) 21.2 MHz (I) 24.9 MHz (J) 28.5 MHz (K) 29.6 MHz
Select Output by Function key
 (F1) SEP 37  (F2) OCT 35  (F3) NOV 34  (F4) DEC 33  (F5) JAN 31  (F6) FEB 30
 (F7) MAR 29  (F8) APR 28  (F9) MAY 26  (F10)JUN 25  (F11)JUL 24  (F12)AUG 24
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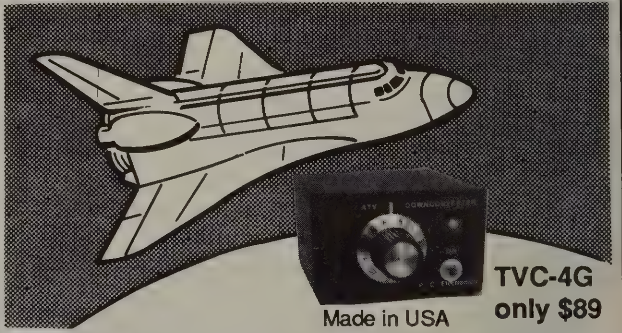

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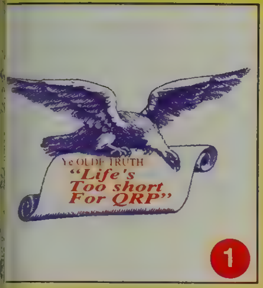
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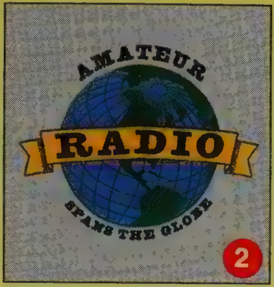
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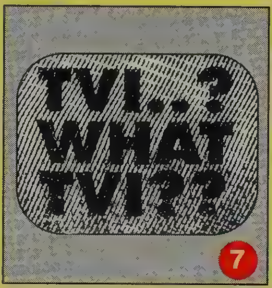

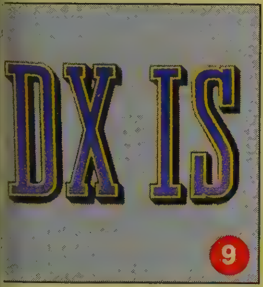

"..my wife said, if I didn't get off the radio, she'd leave me ..OVER"
10

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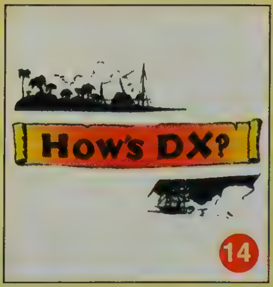

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we activated have any regular VHF activity.

"I had bought a larger 4WD and had planned on adding 902 and all new, bigger antennas for 1995. I'm going to miss Roving a lot. But I'll always remember the adventure of finding good VHF locations in so many areas, the adrenaline and excitement racing against the clock, and of activating rare grids, new ones to so many. I'll remember sailing in the high winds of Kansas, and meeting that shiny and defiant serpent there, too. But I, defiant too, am now like the bird in the gilded cage."

(Postscript by Doug Allen, W2CRS: Randy's new Divisional Record of 178,802 and extraordinary Rover achievement of activating 20 grids would have been worth 9,561 points under the new roer rules, a score easily surpassed, again using the new Rover rules, by operating from Pikes Peak or Mount Evans for a few hours.)

Current Contests

ARRL VHF Sweepstakes: This annual winter classic takes place between 21–23 January, beginning 1800 UTC 21 January and ending 0300 UTC 23 January. This is the only VHF contest that features club competition. This is the first ARRL contest with the new rover rules. If you plan to be a rover, then be sure to check out the changes. The complete rules appear in the December *QST*. Exchange is your grid square. As always, send your log and summary sheets to the League.

Current Meteor Showers

The Quads: The *Quandrantids* or *Quads*, is a brief, but very active meteor shower. Expected peak is around 0038 UTC on 3 January. The actual peak can occur ±3½ hours of the predicted peak. The best paths are north-south. Long duration meteors can be expected about 1½ hours after the predicted peak. As always, look to 3818 or 3843 kHz in the evening hours for opportunities for schedules.

Coming Conferences

The following information on conferences that I know about is presented with this disclaimer: The dates are tentative, and thus not guaranteed. Contact the organizer for more up-to-date information if you are interested.

April: Dayton, the biggest event of the year, will also feature the VHF forum. While the program for the forum is not set at this time, it is always worthwhile to attend. Dates for Dayton are 28–30 April.

June: Ham-Com will be 9–11 June. As usual, the North Texas Microwave Society will put on at least two forums. The convention will be held at the Arlington Convention Center. For more information, call 214-522-5003, or FAX 214-521-0016.

July: The Central States VHF Society will hold its annual conference in Colorado Springs, Colorado, 28–30 July. Contact President Lauren Libby, KX0O, at 719-593-9861 for more information.

September: The eleventh anniversary of the Microwave Update conference will be held in Arlington, Texas at the La Quinta Inn in either late September or early October. Contact Kent Britain, WA5VJB, at 214-660-2810 for more information.

News of Newsletters

Rocky Mountain VHF+: Doug Allen, W2CRS, has turned the "Rocky Mountain VHF+" into an excellent publication chock full of news from the Rocky Mountain area. Construction and feature articles made the November issue 20 pages long! For your subscription, send $12 to Doug at P.O. Box 5646, Woodland Park, CO 80866.

The ownership of "2-meter EME News" has transferred to Doug effective with the January issue. Doug advises me that he will keep this as a separate newsletter from the "Rocky Mountain VHF+" newsletter. He will be raising rates to $14 for U.S., $16 for Canadian, and $20 for foreign. Doug also advises me that he will be changing the title to reflect the inclusion of EME reports from 6 meters and 135 cm. Contact Doug at the above address if you are interested in a subscription.

13 cm Band Threat An Update

In early November the FCC announced plans to reallocate the 2390–2400 MHz and 2402–2417 MHz bands via the auction process. Citing their awareness that such reallocation would be disruptive to the amateur service (an understatement) which is assigned to it on a secondary basis, the Commission invited comments. As of the writing of this column, actual deadline dates are unknown. If you are interested in commenting, check with ARRL Bulletins for more up-to-date information.

"Feed Point," the newsletter of the North Texas Microwave Society, reports the following: "IBM, SouthWest Bell, and Loral have all filed petitions with the FCC to stop the auction of the frequency of 2402–2417 MHz. It is the position of these companies that since the band already has full access from the public as an ISM band, they are not being sold new spectrum."

Considering that the FCC received around $685 million at the last auction, one can readily see that our VHF and microwave bands continue to remain under a threat. Therefore, it is well that we heed the advice that Jack Kelleher gives above, that of avoiding any hint of commercial use of our amateur radio frequencies. No more ordering pizzas via the autopatch!

The New Rover Rules

Known as the "W3EP Rules" because Emil Pocock, W3EP, writing as an individual and not as a columnist, proposed the new rover rules that have been adopted by the ARRL for their contests, these rules have also generated some controversy even before they are implemented. In conversations over the phone, over the air, in person, and through correspondence both via the mail and the Internet, I have been hearing a majority state that the new rules are punitive, at best. Many of the complainents said they have run their last rover operation.

Wait a minute! How can you say that these rule won't work if you don't operate? If you want to see the rules change again, you can't stay on the sidelines!

In order to determine just what effect these new rules are having, I am running the accompanying survey. I have placed a short deadline on it so that I can publish the results in May or June, in time for the June VHF QSO Party. I will again run the same survey for that contest and tally the results for a future column. Get in these contests; have fun; fill out the survey.

I will use the results of the two surveys and possible subsequent surveys for evaluation of possible changes in *CQ*'s VHF contest in July. Please complete the survey and mail it to me by 28 February 1995.

And Finally . . .

The following was written by Paul Drexler, WB3JYO, the president of the Packrats, and is from the November 1994 "Cheese Bits," the newsletter of the Mt. Airy VHF Radio Club, the Packrats.

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Type:	VHF 1/4 Lambda UHF 3/4 Lambda
Impedence:	50 Ohms
Frequency Range:	VHF 144-148MHz UHF 440-450MHz
Polarization:	Vertical
VSWR:	at freq. res.<1.2:1
Max. Power:	VHF 75 Watts, UHF 50 Watts
Bandwidth:at VSWR 1.5:1	VHF/UHF 10MHz
Gain:	VHF 0 dBd - 2.15 dBi UHF 3.8 dBd - 5.95 dBi
Connection:	UHF Female with gold plates center conductor and PTFE (TEFLON) insulator
Length:	approx. 18.5 inch.
Weight:	approx. 8.8 oz.

HP 2000 2m Mono Band

Type:	VHF 3/4 Lambda
Impedemce:	50 OHms
Frequency Range:	144 - 148MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	150 Watts
Bandwidth: at VSWR 1.5:1	4MHz
Gain:	4 dBd - 6.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 60.6 inch.
Weight:	approx. 11.8 oz.

HP 2000 C 2m Mono Band

Type:	VHF 3/4 Lambda
Impedence:	50 Ohms
Frequency Range:	144 - 148 MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	150 Watts
Bandwith: at VSWR 1.5:1	4MHz
Gain:	4 dBd - 6.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 60.6 inch
Weght:	approx. 11.8 oz.

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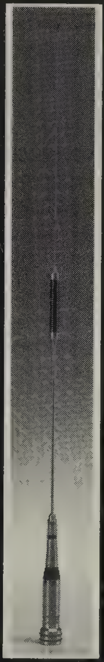

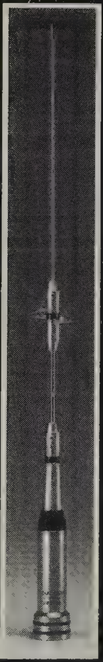

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HP 7000 70cm Mono Band

Type:	UHF 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	440 - 450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	75 Watts
Bandwidth: at VSWR 1. 5:1	10MHz
Gain:	3.2 dBd - 5.35 dBi
Connection:	UHF Femal with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 18.5
Weight:	approx: 8.8oz.

HP 7000 C 70cm Mono Band

Type:	UHF 2 x 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	440-450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	75 Watts
Bandwidth: at VSWR 1.5:1	10MHz
Gain:	6 dBd - 8.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 34.6 inch.
Weight:	approx. 10.9 oz.

HP 2070 H 2m/70cm Dual Band

Type:	VHF 1/2 Lambda UHF 2 x 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	VHF 144 - 148MHz UHF 440 - 450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	VHF 150 Watts, UHF 100 Watts
Bandwidth: at VSWR 1.5:1	VHF 4 MHz UHF 6 MHz
Gain:	VHF 3 dBd - 5.15 dBi UHF 6 dBd - 8.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) insulator
Length:	approx. 41.3 inch.
Weight:	approx. 11.6 oz.

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ROVER SURVEY

1. Name and Call (optional): ______________________

2. Are you normally a Rover in VHF contests?

☐ Yes ☐ No

3. Are you a "captive" Rover?

☐ Yes ☐ No

4. Did you participate as a Rover in the January ARRL VHF Sweepstakes Contest?

☐ Yes ☐ No

5. If you answered no to question 4, why not? (Circle one.)

a. Protest

b. Not in contest

c. Operated a different category (non-protest)

d. Other (please specify) ____________________

6. If you answered yes to question 4, how many grids did you operate from? ________

7. Was this number approximately the same as in previous contests?

☐ Yes ☐ No

8. What was your score for this contest under the new rules? ________

9. What was your score for this contest under the old rules? ________

10. Any other comments (use separate paper if necessary): ______________

____

Please complete and mail this survey by February 28, 1995 to: Joe Lynch, N6CL, P.O. Box 73, Oklahoma City, OK 73101.

Packrats is that they're always ready to help. All you have to do is *ask*.

"I recall some time ago when I first got started in VHF and joined the Packrats I received more help than I thought was humanly possible. I was on maybe one band at the time but I was interested in getting a real VHF station together, and the only way I could afford to do that was by building my own equipment.

"There was much to be learned—building equipment (and making it work), constructing antennas, tower work, and assembling a decent station. All this was possible only through the support and assistance I received from other club members. Within a relatively short time I was on several of the VHF/UHF bands, and in the years to follow I continued to receive help from Packrats as I continued to upgrade my station.

"I have found that it's just as rewarding to be able to hep others from the experience we've gained over the years. Maybe you've had the same experience that I've had."

This is kind of a neat model for the rest of us. One of the ways that Packrats help each other is to have a VHF Building Blitz at one of the members' QTHs. It is an excellent way to help the new guys (and gals) along the experience pathway. The North Texas Microwave Society, and I believe the Rochester VHF Group, also have similar programs. Perhaps your group could think about starting something. Who knows? That new amateur may someday grow to be your top-notch contester or even a magazine columnist!

My thanks to those of you who continue to send me your reports. I also appreciate being on the mailing list of your newsletters. As always, if you have news for the wonderful world of VHF Plus, please send it to me, FAX me at 405-528-0746, call me at 405-528-6625, or e-mail me at 72124.2734@compuserve.com.

My special appreciation goes to those of you who have wished my brother, Bill, and I well as Bill is fighting colon and liver cancer. I expect that he will be alright and back to his old spunky ways real soon. We Lynches are fighters, and there isn't much that can get us down for long. Thanks very much for your love and prayers, the two most important weapons for the battle.

Until next month . . .

73, Joe, N6CL

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TS-850S/AT 9-band xcv	2149.95	Call $
TS-450S/AT 9-band xcv/tuner/mic	1639.95	Call $
TS-450S 9-band xcvr/SW Rcvr/mic	1439.95	Call $
TS-690S 9-band xcvr w/6m/mic	1759.95	Call $
TS-50S Super compact HF xvr	1279.95	Call $
AT-50 External automatic tuner	354.95	Call $
TS-60S Super Compact 6M xvr	1209.95	Call $
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TM241A 50w 2m FM Xcvr	459.95	Call $
TM-733A 2M/70cm Mobile	749.95	Call $
TM-742A 50/35w/2m/440 FM xcvr w/TTP	939.95	Call $
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DFK-4 13' remote cable kit	51.95	Call $
DFK-7 23' remote cable kit	84.95	Call $
TSU-7 CTCSS decoder unit	55.95	Call $
UT-28S 50w 10 meter unit	339.95	Call $
UT-50S 50w 6 meter unit	339.95	Call $
UT-220S 25w 220 MHz unit	339.95	Call $
UT-1200 10w 1.2 GHz unit	439.95	Call $
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TM-255A FM,SSB,CW,2M, Detach Panel	1109.95	Call $
TM-455A 440MHz Mobile, Detach Panel	1279.95	Call $
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TM-451A 35w 440MHz FM	559.95	Call $
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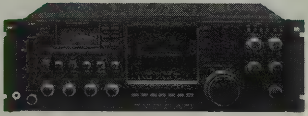

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IC-736 New HF Xcvr w/6 Meters	2385.00	Call $
IC-707 New HF	1032.00	Call $
IC-765 All-Mode HF	4125.00	Call $
IC-738 All-Mode, 100w Tuner	1935.00	Call $
IC-728 New, All-Band HF	1325.00	Call $
IC-729 All-Band HF Plus 6 Meters	1492.00	Call $
IC-2KL 500w, Amp	2710.00	Call $
IC-4KL 1 kW Amp	9000.00	Call $
Receiver		
IC-R1 100 khz - 1300 MHz	567.00	Call $
IC-R72 30 kHz - 30 MHz Rcvr	1145.00	Call $
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IC-T41 New, 440MHz HT	472.95	Call $
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IC-Δ1A 2M/440/1.2GHz, HT	987.00	Call $
IC-X2A 440MHz/1.2GHz HT	772.95	Call $
IC-X21AT 440MHz/1.2GHz FM	960.00	Call $
IC-2330 2M/220MHz Mobile	865.95	Call $
IC-2340H 2M/440MHz Mobile	749.95	Call $
IC-2700H 2M/440MHz Mobile Detch Panel	959.95	Call $
IC-820H 2M/440MHz All-Mode	1999.95	Call $
IC-970H All-Mode, 45w	3964.00	Call $
IC-Δ100H 2M/440MHz/1.2GHz Mobile	1570.00	Call $
220 MHz		
IC-3SAT, 2.5W, 220 HT	399.00	Call $

YAESU

HF Equipment	List	Jun's
FT-1000 Transceiver w/PS/Tuner	$4099.00	Call $
FT-1000D Top Performer	$5199.00	Call $
FT-990 Transceiver w/PS/Tuner	$2699.00	Call $
FT-990DC All Mode	2299.00	Call $
FT-890/AT HF Base	1699.00	Call $
FT-840 New Compact HF	1099.00	Call $
FT-900 Mobile Or Base, Remv. Frt. Panel	1499.00	Call $
FT-900AT New HF Mobile	1699.00	Call $
FT-650 100w On 6m, 10m, 12m	1899.00	Call $
FL-7000 15m-160m Solid State Amp	2459.00	Call $
Receivers		
FRG-100B Mini Receiver	699.00	Call $
VHF		
FT-11R, Worlds Smallest 2M HT	369.00	Call $
FT-11RH 5 Watt Version of FT-11R	389.00	Call $
FT-23 R/17 Mini HT	309/329	Call $
FT-2200 50w, 2m Mobile	479.00	Call $
FT-2500M Rugged 2M Mobile	449.00	Call $
FT-290R/690R 6M, All Mode Portable	729/859	Call $
UHF		
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FT-7200 35w, 440MHz Mobile	599.00	Call $
FT-7400H New, Rugged 440MHz Mobile	589.00	Call $
FT-790 R/II 70cm/25w Mobile	839.00	Call $
VHF/UHF Full Duplex		
FT-736R, All Mode, 2m/70cm	2299.00	Call $
Dual Bander		
FT-51R 2m/70cm HT w/ "Windows"	609.00	Call $
FT-530 2m/70cm HT	589.00	Call $
FT-5100 Compact 2m/440 Mob.	779.00	Call $
FT-5200 Compact 2m/440 Mob.	819.00	Call $
FT-6200 Cpt 440/1.2 GHz Mob.	899.00	Call $
1.2 GHz		
FT-911 Compact HT	549.00	Call $
FT-912 10w Mobile	729.00	Call $
Rotators		
G-800SDX med./hvy. Duty	439.00	Call $
G-1000SDX Heavy Duty.	539.00	Call $
G-2700SDX Heavy Duty.	1099.00	Call $
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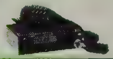

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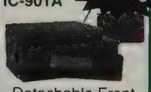

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CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Contesting Remembered

So much has changed in 50 years. In 1945 we were just ending World War II. And at the same time computers, television, space travel, and so many other commonplace aspects of today's society were not even a dream in most people's minds. It's hard to imagine just how much has changed in our world in such a short period of time. Can you picture a world without automatic teller machines and sitdown lawnmowers—or *CQ* magazine?

It should be no surprise to anyone that the world of contesting has also undergone tremendous change in five decades. Just as amateur radio itself has evolved, contesting has also followed.

The Earliest Days

The roots of contesting go back to well before the birth of *CQ*. In fact, some of the very first competitive amateur radio events occurred in the early 1920s in so-called Transatlantic Tests, where the goal was simply to establish either one- or two-way contacts. My guess is that the "contest committee" of that day had a much easier time dealing with the volume of log submissions.

The first "real" contest was announced by ARRL in March 1927 *QST*. It was correctly dubbed the 1928 International Relay Party and had its beginnings in the month of May. The rules of the operating event required international contacts with an exchange of short messages. The final results were announced in August 1928 *QST*—yes, more than one year later. And you thought contest reporting seemed slow today! Prizes were offered to the highest scorers, ranging from $2 coils to $350 receivers. The prizes, mostly donated from manufacturers, required almost three pages of magazine space to list them all, and their total value was $4000 (this compares to a one-year subscription to *QST* of $2.50 in 1928). The final results had "impressive" scores. Here are the top results: #1 USA—1ASR with 305 points; #1 World—British station 5BY with 573 points. Equally surprising were the nine stations that were disqualified!

In 1929 the ARRL conducted a birthday celebration event in observance of Hiram Percy Maxim's 60th birthday. The event was similar in spirit to the recently conducted "/125" event. The idea was to exchange relay messages over a 48-hour period. The ARRL Headquarters station, W1MK (a.k.a. W1AW today), received 356 messages, including over 40 from a single station. I guess duplicate QSOs were allowed!

These events were so well received by amateurs around the world that competitive operating in amateur radio was to remain a fixture that is still with us today.

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Calendar of Events

Dec.	31	RAC Canada Winter Contest
Dec.	31	ARRL Straight Key Night
Jan.	**1-15**	***CQ* Gang Activity**
Jan.	7-8	ARRL RTTY Roundup
Jan.	7-8	Michigan QRP CW Contest
Jan.	14-15	North Amer. CW QSO Party
Jan.	14-15	HA DX Contest
Jan.	21-22	North Amer. SSB QSO Party
Jan.	21-22	ARRL VHF Sweepstakes
Jan.	21-22	YL-ISSB CW QSO Party
Jan.	**27-29**	**CQ WW 160 M CW Contest**
Jan.	28-29	U.B.A. SSB Contest
Jan.	28-Feb.5	ARRL Novice Roundup
Feb.	4-5	New Hampshire QSO Party
Feb.	4-5	Maine QSO Party
Feb.	4-5	Vermont QSO Party
Feb.	11-13	YLRL YL-OM SSB Contest
Feb.	18-19	ARRL CW DX Contest
Feb.	18-19	YL-ISSB SSB QSO Party
Feb.	19	Colorado QRP Club QSO Party
Feb.	**24-26**	**CQ WW 160 M SSB Contest**
Feb.	25-26	U.B.A. SSB Contest
Feb.	25-27	YLRL YL-OM CW Contest
Mar.	4-5	ARRL SSB DX Contest
Mar.	11-12	DIG QSO Party
Mar.	**25-26**	**CQ WW SSB WPX Contest**

Along Came *CQ*

It should come as no surprise to you that *CQ*'s longstanding association with on-the-air operating events has its origins with the very beginning of the magazine. Although the very first CQ WW Contest began in 1948, the very first "World-Wide DX Contest" grew out of an idea developed by Herb Becker, W6QD, the DX contributing editor for *Radio* magazine in 1939. Herb announced the following in October 1939:

"The World-Wide Contest, which should be a break for the working man and those in schools, will be over two weekends, with 48 hours each. The starting time will be 0200 GMT, November 25 and December 2. The competition shall be divided into two divisions, CW and phone. Competitors in the one-operator section may use one transmitter only, and those in the more-than-one-operator section may use any number of transmitters. Remember that the 7, 14, and 28 MHz bands are the only ones used in the contest."

The first WW DX Contest was held in 1939 and was reported in the June 1940 issue of *Radio* magazine. Following the suspension and subsequent resumption of amateur radio after WW II, W6QD showed up on the pages of the newly created *CQ* magazine along with his very popular World-Wide DX Contest in 1948.

Since its inception nearly 50 years ago, the CQ WW Contest rules have remained fundamentally unchanged. Ironically, although contesters tend to separate contesting from DXing, it was the growth of DX chasing that advanced the phenomenal interest in contesting during those early years.

Judging by the operator comments in the early issues of CQ WW reporting, the inaugural CQ WW Contest was a colossal success. The "DX men," as they were referred to, overwhelmingly supported the concept of zone/country multipliers, 48-hour operating periods, one-weekend limits, elimination of QSO quotas, and so on. With contesting having 20-plus years under its belt, the CQ WW was destined to be successful. The second year's activity (1949) exceeded the first by nearly 100%, forcing the magazine to begin publishing results over a two month period. In that same year 80 meters was experimentally dropped. Imagine how today's 80 meter bigguns would feel about that!

In today's age of the information super-highway it may seem trivial, but promoting the contest world-wide was no easy task in the 1950s. As the contest changed hands from *CQ* to a group of volunteers and back to *CQ* in the mid-1950s, it is clear that the turning point of the long-term existence of the CQ WW was in 1956. At that time Frank Anzalone, W1WY, volunteered to form a committee and bring control of the contest back to *CQ*. This happened quite by accident, as he was visiting *CQ* headquarters on other business and noticed the enormous pile of logs. It was that encounter which prompted Frank to later recall, "We didn't realize what we had let ourselves in for . . . " Frank's able command lasted for another 20 years.

The 1959 contest was a landmark year as the Multi-Operator/Multi-Transmitter category was tested for the first time. Early results were hardly encouraging, but we can safely say that it was an experiment that worked.

The CQ WW leadership changed hands again in 1974, when Fred Capossela, K6SSS, accepted the position of Contest Director. Fred's competent leadership continued the fine tradition of the contest for two more years, until the establishment of co-directors Bob Cox, K3EST, and Larry Brockman, N6AR, in 1979. With the retirement of Larry Brockman, N6AR, in 1993, the contest continues to go forward today under the able leadership of K3EST.

Decades of Change

Although the fundamentals of contesting haven't changed very much in 50-plus years, technology and other factors have. Amateur radio was very different in the '50s and '60s. There were fewer pileups, more CW operators, and certainly no DX lists. And yes, amateurs signed their entire callsigns.

Over the years, however, contest operating strategy has become more sophisticated. In the 1950s, for example, it was unheard of to move a needed multiplier to another band.

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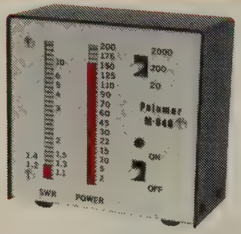

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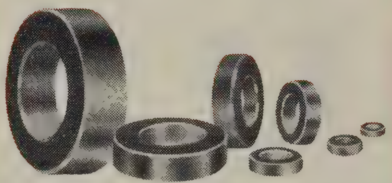

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There wasn't a single operator on the planet who was using two radios. Only a select few stations had stacked Yagis or even a rotary beam on 40 meters.

Today's contester has come from a humble beginning. When looking at contesting from a world-class perspective, the barriers to entry can be intimidating, to say the least, if you want to be a winner. Fortunately, contesting is also fun. It was fun in 1927, and it's still fun today. For me, I had the time of my life in the 1970 ARRL Novice Roundup, and the 1994 CQ WW was equally enticing (band conditions and all!). But growth in contest participation has been the norm for decades. In 1948, for example, *CQ* received 174 logs in the CQ WW SSB contest. That number grew to nearly 3000 in 1980, and broke though the 3000 barrier in the 1990s. A world-class entry had only a few hundred contacts in 1948. Today, however, the single operator numbers from overseas exceed 9000 QSOs.

Is there a limit to this growth? Naturally there must be. Just like the 100 yard dash, a contester can do only so much physically and with the available technology. The more important question to ask as we look forward to the next 50 years is, is there a limit to the fun that contesting offers its participants? I say, NO! With that in mind, here's my toast to the next 50!

Final Comments

I am pleased to be able to report the results of this year's Contest Survey in next month's Contest Calendar. I have to admit that I'm still amazed at the volume of responses and effort each of you took in replying. There are going to be a few surprises and some interesting results. I'm sure you'll enjoy it as much as I have.

Be sure to check out the "*CQ* Gang" operating event during the first two weeks of January. There literally will be hundreds of *CQ*/50 participants operating on the bands, with yours truly being one of them. I hope we have the chance to work each other.

In closing this month I want to say thank you for helping make our 50th anniversary something to remember. It's your support over the years that has made *CQ* what it is today!

73, John, K1AR

Michigan QRP CW Contest

1200Z Sat. to 2359Z Sun., Jan. 7–8

This is the 15th annual CW contest sponsored by the Michigan QRP Club. The contest is open to all amateurs and all are eligible for awards.

Classes: (A) Less than 250 milliwatts. (B) 250 milliwatts to 1 watt. (C) 1 watt to 5 watts. (D) Over 5 watts.

The same station can be worked on each band for QSO and multiplier credit.

Exchange: RST; state, province, or country; and club membership number. Non-members send power output.

Scoring: Contacts with members 5 points. Non-members in W/VE are 2 points; outside W/VE are 4 points. Credit a scoring bonus of 1.25 if power used is either receiver or transmitter is homebrew and 1.5 for a totally homebrewed station.

Final Score: Total QSO points × states, provinces, and countries worked per band × power bonus if applicable.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50060. Novice—3710, 7110, 21110, 28110 kHz.

Awards: Certificates to top scorers in each state, province, and country.

Use a separate log for each band and include a summary sheet showing the scoring, operating class, and equipment used, plus the usual signed declaration.

Logs must be received no later than February 4th by L. T. Switzer, N8CQA, 654 Georgia, Marysville, MI 48040. Include a large SASE for a copy of the results or for sample forms.

ARRL RTTY Roundup

1800Z Sat. to 2400Z Sun., Jan. 7–8

This is the seventh annual all-digital contest sponsored by the ARRL. Any station may work any other station worldwide. More than one digital mode may be operated, but QSOs and multipliers are counted once only regardless of modes used.

Operation is limited to 24 hours out of the 30-hour contest period. Two rest periods must be taken in two separate blocks of time and must be clearly marked in the log.

Modes: Baudot, RTTY, ASCII, AMTOR, and packet.

Bands: 3.5–30 MHz on those frequencies recommended for digital operation (no 10, 18, or 24 MHz).

Categories: Single operator, multi-band, (1) less than 150 watts output, (2) 150 watts or more. Also multi-operator, single transmitter, all band.

Exchange: Signal report and QTH. State for the U.S., province for Canada. DX will send a serial QSO number.

Scoring: One point per QSO. A station may be worked once per band for QSO credit.

Multiplier: Each US state (48), each VE province (12), and each DXCC country, counted only once, not once per band (KH6 and KL7 are countries; VO1/VO2 counts as one VE province).

Entries with 200 or more contacts must submit a duplicate QSO check sheet.

Awards: Certificates to the top-single operator, both low and high power, and multi-operator scorers in each ARRL/CRRL section, and each DXCC country. Novice/Tech entrant with at least 50 QSOs will also receive a certificate.

Detailed information appeared in the November issue of *QST*. Contest forms are available from the ARRL for an SASE and two units of first-class mail.

Postmark your entry by February 8th and send it to: ARRL RTTY Contest, 225 Main Street, Newington, CT 06111.

1995 North American QSO Party

CW: 1800Z Sat. to 0600Z Sun., Jan. 14–15
SSB: 1800Z Sat. to 0600Z Sun., Jan. 21–22

The object of this one is to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period. North American stations are defined by the rules of the CQ WW DX Contests with the addition of KH6.

Classes: Single operator and multi-operator, two transmitters. Multi-operator stations must keep a separate log for each transmitter and must have at least 10 minutes between band changes. Use of helpers or spotting nets by single operator entries is not permitted. Single operator entrants may have only one transmitted signal at a time. Output power is limited to 100 watts for eligible entries. Multi-operator stations may operate for the entire 12 hour period. Single operator stations may operate 10 out of 12 hours. Off times must be at least 30 minutes in length and must be clearly marked in the log.

Mode: CW only in CW parties. Phone only in phone parties.

Bands: 160-10 meters only (no WARC bands). A station may be worked once per band. Suggested frequencies are 1815, 3535, 7035, 14035, 21035, and 28035 (20 kHz up from band edge for Novice) on CW; and 1865, 3850, 7225, 14250, 21300, and 28450 on phone. Try 10 meters at 1900Z and 2000Z, 15 meters at 1930Z and 2030Z, and 160 meters at 0430Z and 0530Z.

Exchange: Operator name and station location (state, province, or country).

Scoring: Multiply total valid contacts by the sum of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canadian call areas (VE1-VE8, VO1, VO2, VY1, and VY2), and other North American countries. Do not count USA, Canada, KH6, or KL7 as countries. Non-North American countries do not count as multipliers, but may be worked for QSO credit.

Team Competition: Team competition is limited to a maximum of five single operator stations as a single entry unit. To qualify as a team entry, you must register the name and callsign of each operator, and callsign of the station operated should the operator be a guest at a station other than his own (e.g., N4RJ op. by KM9P). Teams must be registered with W9NQ.

Penalties: For each unmarked duplicate QSO, you lose that contact plus an additional three contacts. For each QSO for which you are not in the other station's log, you lose that QSO plus an additional one contact. And for each QSO for which the log data is incorrectly copied in any respect, you lose that contact. Entries with score reductions greater than 5% will be disqualified.

Awards: A total of five trophies will be awarded for the high score in each of the following categories: Single Operator CW and Phone, Multi-Operator CW and Phone, and Single Operator Combined score. Certificates of merit will be awarded to the highest scoring entrant with at least 200 QSOs from each state, province, and North American country.

Send all North American QSO Party entries to Bob Selbrede, W9NQ, 6200 Natoma Ave., Mojave, CA 93501. Entries must be postmarked no later than 30 days after the party to be eligible for trophies and awards. Logs may be submitted on disk in the form of files generated by K8CC's NA program or MS-DOS ASCII files.

HA DX Contest

2200Z Sat. to 2200Z Sun., Jan. 14–15

Sponsored by the Hungarian Radioamateur Society, this is one of several very popular Eastern European contests. The contest is CW only, and stations may only be worked once per band.

Exchange: RST plus serial number (599001). HA stations will also send a two-letter code corresponding to their county. The possible codes are BA, BE, BP, BN, BO, CS, FE, GY, HA, HE, KO, NO, PE, SA, SO, SZ, TO, VA, VE, ZA.

Scoring: Count 6 points per HA QSO and 3 points for non-HA QSOs on other continents. Final score is total QSO points times sum of HA counties worked per band.

Entries are due six weeks after the contest and should be sent to: Hungarian Radioamateur Society, Box 86, Budapest H-1581, Hungary.

ARRL VHF Sweepstakes

1900Z Sat. to 0400Z Mon., Jan 21–23

This is the 48th ARRL January VHF Sweepstakes. ARRL Headquarters recommends that you use the official log forms. It will make your log keeping and scoring much easier. A large SASE to Newington will get you the necessary forms.

Complete rules can be found in the December issue of *QST*. They are a bit complicated, so look them over carefully.

1995 YL-ISSB QSO Party

CW: Jan. 21–22 SSB: Feb. 18–19
0001Z Saturday to 2359Z Sunday

This event is open to all, although emphasis is on membership involvement.

Exchange: Signal report, state/province/country, name (if member sends ISSB number also).

Categories: Single Operator, DX-W/K Partner, YL/OM Team.

Scoring: Credit 3 points for member contacts within the same continent; 6 points for member contacts in different continents; 1

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Frequencies: Use the General portion of the bands. Avoid net operations. Check 40/80 meters on the hour.

Awards: Certificates will be awarded to the top three scorers in each category. A special ZL award will be sent to the station working the most ZL prefixes.

Logs must be received by April 30th and should be sent to: Rhonda Livingston, N4KNF, 2160 Ivy Street, Port Charlotte, FL 33952.

CQ WW DX 160 Meter Contest

CW: Jan. 27–29 SSB: Feb. 24–26
2200Z Friday to 1600Z Sunday

Complete rules were published in the November issue. The following is a brief overview.

Exchange: RS(T) and QTH. State for the U.S., areas for Canada, country abbreviation for DX.

Scoring: Contacts with stations in own country 2 points, other countries in same continent 5 points, and with other continents 10 points.

Multiplier: Each U.S. state (48), Canadian area (13), and DX country. (ARRL and WAE country lists and WAC boundaries are the standards.)

Awards: Certificates to the top-scoring stations in each U.S. state, Canadian area, and DX country. A assortment of plaques for U.S. and world winners.

Penalties: Three contacts will be deleted for each duplicate that has not been removed.

Disqualification: Taking credit for excessive duplicate contacts, the usual rule violations, and unsportsmanlike conduct will be grounds for disqualification.

Mailing deadline for logs is February 28th for CW entries and March 31st for SSB entries.

Logs should be sent directly to: CQ 160 Meter Contest, David L. Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092. **Be sure to indicate CW or SSB on the envelope.**

ARRL Novice Roundup

0001Z Sat. Jan. 28 to 2359Z Sun. Feb. 5

This is a 9-day long contest, but only 30 hours of actual operating time are permitted for scoring.

Novices/Techs will work each other and higher class licensees, who of course are limited to contacting Novices/Techs only. All bands and modes open to Novicse/Techs can be used.

Exchange: Signal report and ARRL section (country for DX stations).

Scoring: One point for phone QSOs, two points for CW, including RTTY and packet.

Multiplier: Each ARRL section plus each DXCC country. There is also a bonus for stations holding a code proficiency certificate.

Final Score: Add your code bonus to your QSO points total and multiply that total by your multiplier.

Awards: Certificates to every Novice/Tech who submits a valid entry. Higher class licensees are not eligible for awards.

The use of official forms is necessary. A large SASE to ARRL Novice Roundup will get you a contest package with all the forms. The January issue of *QST* had a detailed announcement with suggestions and operating details not covered here.

Postmark your entry no later than March 6th to: ARRL Novice Roundup, 225 Main Street, Newington, CT 06111.

U.B.A. SSB/CW Contest

SSB: 1300Z Sat. to 1300Z Sun. Jan. 28–29
CW: 1300Z Sat. To 1300Z Sun. Feb. 25–26

This contest is sponsored by the Belgium Amateur Radio Union (U.B.A.). Any station may work any other station worldwide. Numerous operating awards are available, and contest QSOs may be credited towards these awards.

Classes: Five categories—Single Operator, All Band/Single Band, Multi-Operator/Single Transmitter, QRP 5 watts, and SWL.

Frequencies: CW—3500-3560, 7000-7035, 1400-14060, 21000-21060, 28000-28060 kHz. SSB—3600-3650, 3700-3800, 7040-7100, 14125-14300, 21175-21350, 28400-28700 kHz.

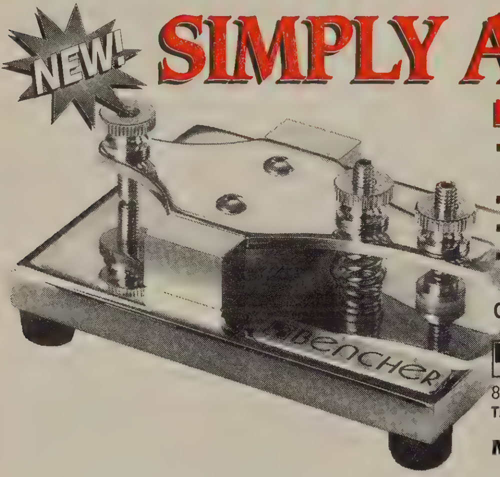
Exchange: RS(T) and consecutive serial number. Belgian stations also give their province abbreviation.

Multipliers: All Belgian provinces, prefixes—ON4-9, DA1–2, and European Community countries.

Scoring: QSOs with ON count 10 points. European QSOs count 3 points. All others count 1 point. Final score is total QSO points times total multipliers.

Awards: There are several awards available, including trophies and certificates to the high scorers in each operating class.

Send final results no later than 30 days after each contest section to: UBAHF Contest Committee, Galicia Jan, ON6JG, Oude Gendarmeriestraat 62, B-2220 Heist Op Den Berg, Belgium. Logs may also be submitted on disk in K1EA's CT or ASCII format.



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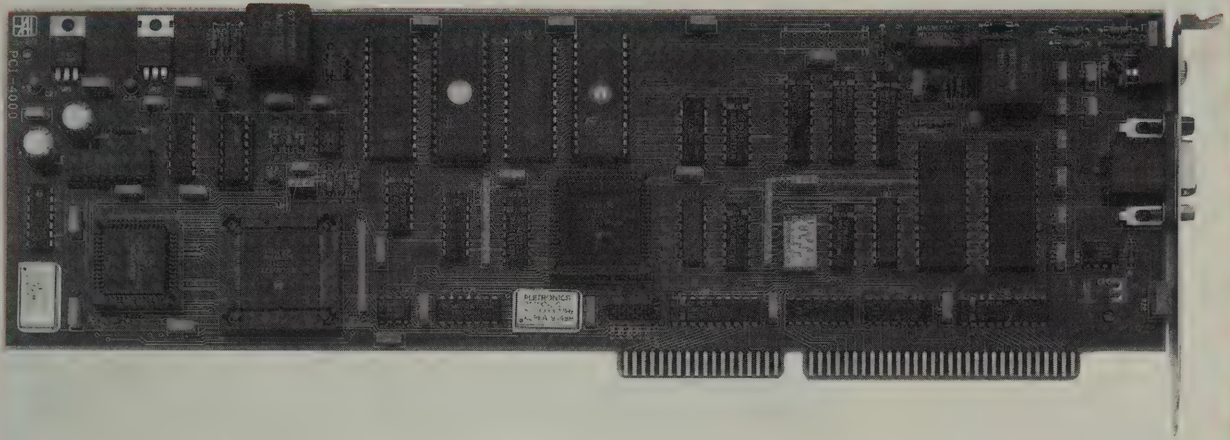

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WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Special Interests Yesterday and Today

Fifty years of *CQ* and 600 months worth of great reading from some of the top names in amateur radio's history. Incredible! Yes, and just looking through some of those old-time issues from yesteryear escalates one's interest in our great hobby by 10 dB! Actually, I consider *CQ* closer to 76 years old, because it was known as *Radio News* prior to 1945 and originally began as the *Pacific Radio News* during the late teens (the era of spark). Needless to say, I am proud to be a member of the *CQ* gang and hope our combined efforts in keeping you enthused and informed continue another 50 years—and beyond. I also think editor Alan Dorhoffer, K2EEK, publisher Dick Ross, K2MGA, along with the entire office staff deserve a round of applause for a job well done in helping amateur radio expand and flourish. I have worked with numerous amateur radio magazines worldwide and have always found *CQ* to be totally professional. Jolly good show, guys!

In light of this 50th anniversary issue and *CQ*'s reference to my area of expertise as "special interests," this month's column features a "then and now" treat everyone should find interesting. Naturally, this will mean again moving at a fast pace, so hang on as we trek from vacuum tubes to Virtual Reality. We will begin with some brief reflections on the always popular areas of equipment and QRP, then progress to OSCAR, RTTY, SSTV, etc. Ready? Let's go!

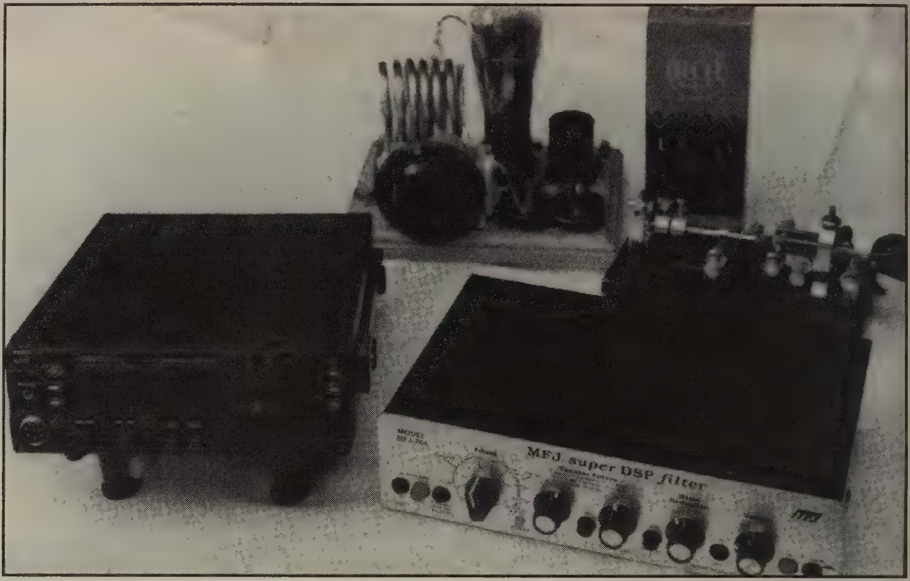

Fig. 1– Significant developments in amateur radio equipment have taken place during the past 50 years, and CQ has been there every step of the way. The latest and greatest evolution is mini HF transceivers such as Kenwood's TS-50 and MFJ's model 784 Digital Signal Processor shown here with a 1930 rig in the background. This dynamic duo is incredibly small, yet terrific for working the world on SSB, CW, RTTY, AMTOR, or packet.

Evolutions in Equipment

Amateur radio started out during the era of spark, a time when amateur gear was totally homebrewed from items such as Model "A" auto spark coils, copper tubing, a stack of batteries, galena rocks, and fine wire called "catwhiskers." A transmitter's key literally flamed with high voltage, an operator's hair often stood on end from stray static electricity when sending Morse, and miniature lightning bolts arcing from antenna wires often started brush fires. Frequencies were unknown. Transmitters covered the full spectrum, receivers were super-broad, and operators just recognized each other by the note of their signal (imagine 20 different size buzz saws cutting through 10 different types of wood for a good audio analogy).

Next came the advent of vacuum tubes, quartz crystals, "clean" signals, and specific-frequency amateur bands. Receiver technology moved up to regenerative designs, and a voice mode known as Amplitude Modulation acquired a popular place beside CW. A few companies such as Pilot and National began making some gear, but the vast majority of amateur equipment was still homebrewed from junked radio parts, "talkie" movie house tubes, and other "loose ends." The average station ran 5 to 10 watts of power, with a few hearty souls building 250 watt rigs and many amateurs using battery power and running less than 1 watt (the beginning of QRP!).

Superheterodyne receivers and VFO-controlled multi-stage transmitters were next, followed by crystal filters, Q multipliers, a new voice mode known as Single SideBand, and an all-in-one-box station—the transceiver. Progressions from that point are recent history: development of the transistor, ICs, Large Scale Integration, and today's most recent evolutions, mini HF transceivers and Digital Signal Progressing (fig. 1). A million small steps and equipment variations were part of the previous discussion. Singling out one or two of them is what we call today pursuing the joys of classic rigs and those golden days of amateur radio's past.

Progress is a natural part of life and technical evolution, and amateur radio tomorrow may seem as different from what it is today as amateur radio today is to yesteryear's age of spark. One progression I foresee is a two-section HF transceiver with its complete "front end" and RF stages (including large antennas and rotors) remote-mounted in a prime DXing spot, and the IF/AF section located in a home or condo. Transceiver sections would be linked via microwaves (which easily convey the full 1 to 30 MHz range for home/IF tuning), and only a small windowsill-mounted dish reveals the presence of a big-time amateur. You would have the ability to work all bands with a killer signal, no line noise, no TVI, and no barking neighbors—ham heaven!

Another evolution already in our grasp and waiting to be realized is what we might call "packetized voice"—that is, speech concentrated into a narrowband digital signal for more efficient spectrum use and greater communications reliabil-

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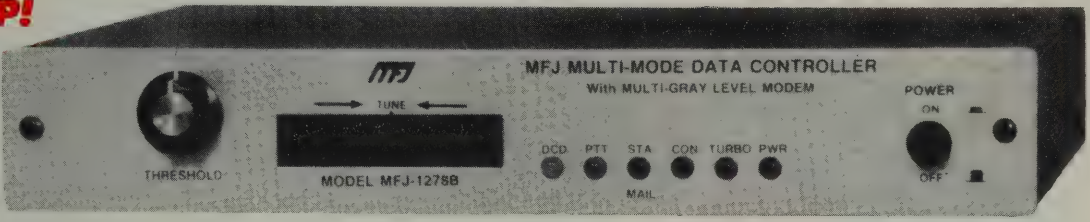
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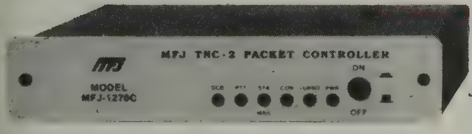

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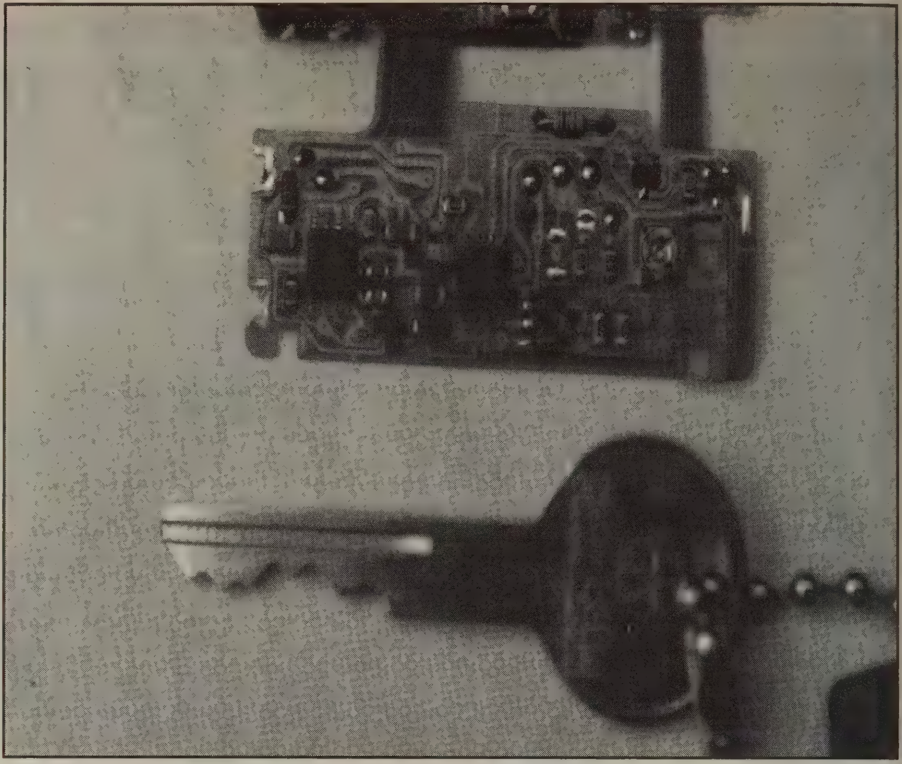

Fig. 2– The availability of low-cost microminiature components and tools for working with them will soon open an exciting new dimension in palm-size QRP rigs.

ity. Consider, for example, today's increasingly popular voice mail systems that store telephone messages on an IBM-compatible computer's hard drive as data. Those voice messages are converted to ASCII, which means they can also be printed out. Such being the case, only some software development would convert it to packet, and adoption of speech synthesis would convert that back from packet to voice. Since packet systems are already in use throughout the world, this evolution has the potential of becoming an overnight success.

What about QRP? This area, which has always been known for its small rigs, holds some really exciting possibilities during coming times. Chip resistors, capacitors, transistors, and surface-mount ICs (plus large magnifiers for construction!) will soon be combined to make some truly miniature HF transceivers (fig. 2). Assuming development of an equally small power source, a complete HF station could easily slip in a shirt pocket. This area of "operate anywhere" will always be popular, as it combines operating skill and savvy with the game of chance—riding the waves of ether and playing propagation effects to the max. May the thrill last forever!

Evolution in Amateur Satellites

Our amateur satellite program has come quite a long way and made admirable progress since its beginning in late 1961 (the time of OSCAR 1's launch). Two meter "Hi" signals from OSCAR 1 lasted only two weeks before on-board dry-cell batteries died, but that was long enough to introduce amateurs worldwide to the excitement of space communications. Financial and technical support for more satellites followed, amateur radio groups in other countries joined the quest, and our OSCAR program began flying high.

OSCAR 2 was another short-lived and transmit-only satellite. Then OSCAR 3's accidental launch into an elliptical orbit opened another dimension that would be used to advantage later with OSCAR 10 and OSCAR 13. Australia's OSCAR 6 was our first big-time satellite. It carried a 2 to 10 meter transponder and solar power system, and relayed signals between modestly equipped amateurs for several years. That satellite was followed by two more low-orbiting high achievers many of us remember as outstanding 2 meter/10 meter "birds"—OSCAR 7 and OSCAR 8 (we are now up to 1981). Then came the high elliptical orbiting OSCAR 10 (it had a terrific 70 cm to 2 meter transponder!) and OSCAR 13. Nothing has equalled those satellites, but our upcoming Phase 3D promises to be even better! Satellites, incidentally, are designated according to their proposed application before launch and given an "OSCAR number" after attaining orbit. Phase 1 satellites were beacon transmitters, Phase 2 birds are low orbiters, and Phase 3 birds are globe-spanning high elliptical orbiters.

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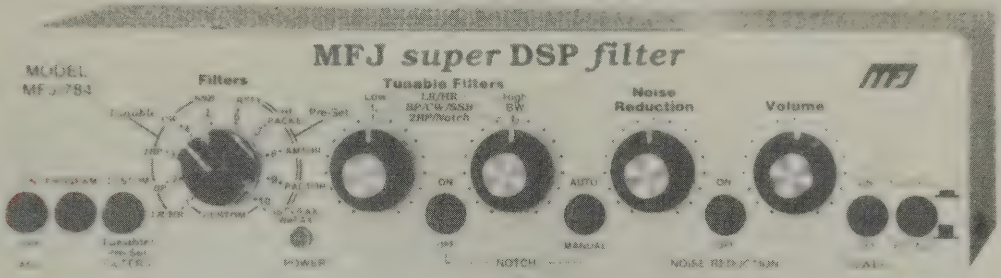

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You get MFJ's *tunable* FIR linear phase filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 60 dB attenuation just 75 Hz away.

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***Only* MFJ gives you 5 *factory* pre-set filters and 10 *programmable* pre-set filters that you can customize. Instantly remove QRM with a turn of a switch!**

You get MFJ's *automatic notch filter* that searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction.* It silences background noise and QRN so much that SSB signals sound like a local FM repeater.

The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable and pre-set filters.

***Automatic gain control* (AGC) keeps audio level constant during signal fading.**

Automatic notch filter

MFJ's *automatic* notch filter searches for and eliminates *multiple* heterodynes. It's *milli*-second fast -- interfering CW and RTTY signals are also eliminated.

Voice signals aren't degraded because the notch is *extremely* narrow.

With up to 50 dB attenuation, you'll copy stations otherwise masked by heterodynes, miss fewer calls and be less exhausted.

Leave the *automatic* notch filter on during a phone contest and you'll never hear unwanted heterodynes of tuner-uppers.

You can *selectively* remove tones. Say, you're on CW and a couple of annoying CW stations appear nearby. You can use the *two* manually *tunable* notch filters -- *an MFJ exclusive* -- to completely knock them out.

Adaptive noise reduction

Turning on *noise reduction* silences background noise. Noisy SSB, FM, AM, CW and Data signals become readable.

Noise reduction works in all filter modes and on all random noise -- white noise, impulse noise, static, ignition noise, power line noise, hiss and atmospheric noise.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

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For Voice and Data, nothing beats MFJ's exclusive *tunable* highpass/lowpass FIR linear phase "brick wall" filters.

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Signals *just 75 Hz* away literally disappear -- they are reduced a *thousand* times, 60 dB!

Unlike other filters, speech clarity is not reduced by envelope distortion caused by unequal time delay.

By adjusting the highpass and lowpass filters you can create *custom* filters for Voice, Data and other modes.

When signals are weak, you can improve copy by removing high and low speech frequencies. They contain little information but are full of noise that reduce readability.

On crowded HF bands, overlapping SSB signals make copying difficult. You can improve copy by slicing off some overlap with razor sharp "brick wall" responses.

You can also highpass filter out hum, pulses, rasp and other irritating low frequency noise.

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in an MFJ *tunable* FIR bandpass filters.

You can *tune* the center frequency from 300 to 3400 Hz. And *vary* the bandwidth from 30 Hz to 2100 Hz -- from super tight CW filters to wide razor-sharp Data filters.

As you narrow the bandwidth, interfering signals drop out, because, just 60 Hz away, they're down by over 50 dB.

You can use *narrower* bandwidths to fight tough QRM because these linear phase filters don't distort signals with unequal time delays.

Even with the narrowest 30 Hz bandwidth, you'll never have a problem with ringing.

One position gives you *two* tunable filters you can use together on one signal. For example, on RTTY, tune one filter to mark, the other to space and set the bandwidth tight for an incredibly sharp RTTY filter.

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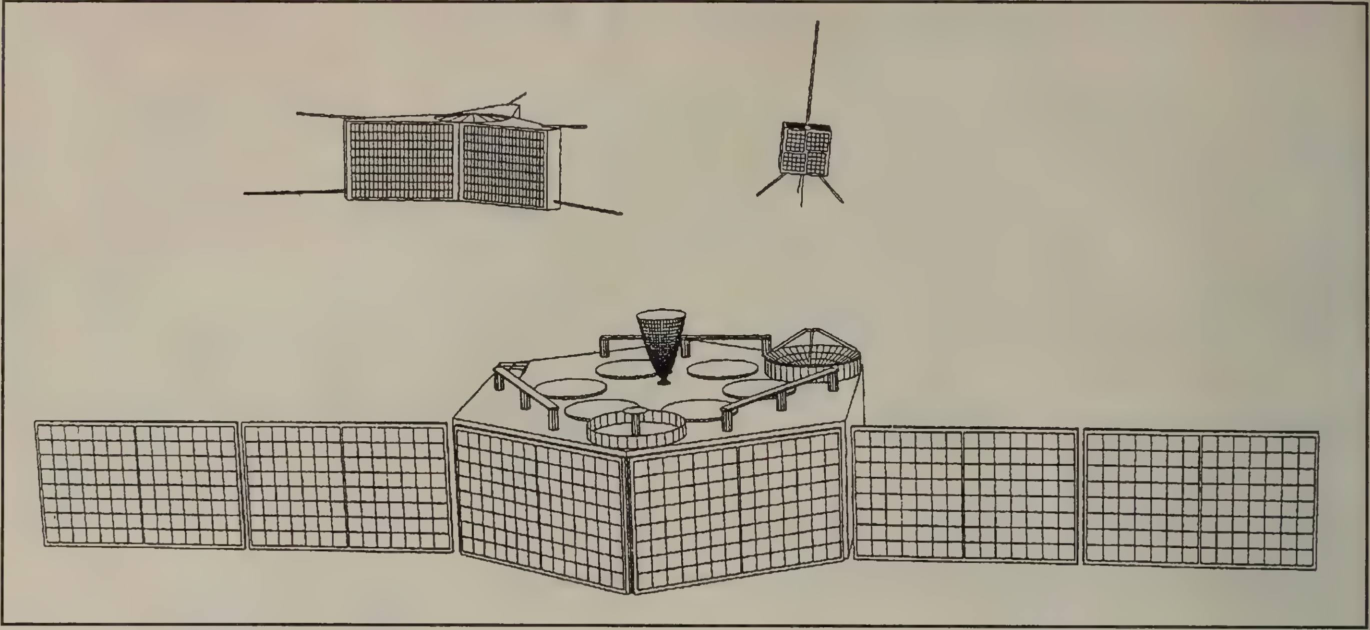
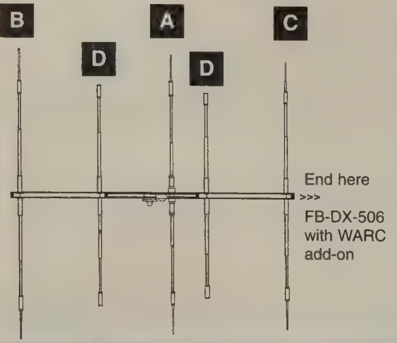


Fig. 3– Artist sketch of our upcoming Phase 3D "super satellite" size-referenced to OSCAR 13 (left) and a microsat (right). Spacecraft is presently in final stages of construction, scheduled for launch during 1996, and will dwarf the capabilities of all previous satellites.

Since OSCAR 10 is almost kaput, and OSCAR 13 is due to fall from orbit any day, a group of low-orbiting OSCARs are presently the focus of amateur activity. Heading the list is Russia's RS-12/13, which relays 2 meter and 15 meter signals to 10 meters. Several microsats are also operational as flying mailboxes for packet. One includes a digitalker, one has an earth-viewing tv camera, and one sports a single-channel crossband FM repeater. Late-breaking news and orbital tracking data on the previously mentioned satellites are broadcast every Sunday at 1900 GMT on 14.282 MHz by the AMSAT net.

Assuming funds and final assembly come together as anticipated, Phase 3D (OSCAR 25?) should be launched during



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	Then add this		
C	Makes a 3-element beam	FB-33	9.2/8.2/7.7
	Then add this		
D	Makes a 5-element beam	FB-53	9.2/9.2/8.7
	Finally *		
	5-element-6 band	FBDX-506	10-12-15-17-20-30
		Gain DBI	7.7-8.2-9.2-7-6.8-6.4

* You can add in lieu of WARC 40m kit to FB33/53 only

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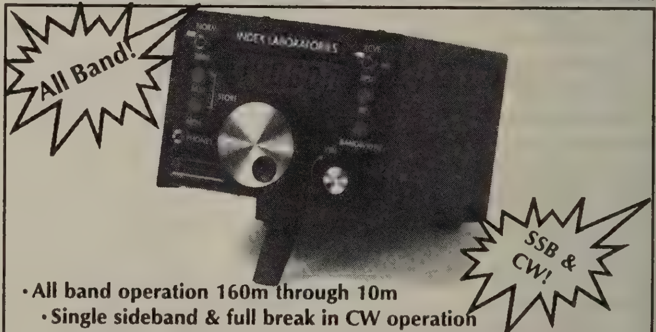

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- Single sideband & full break in CW operation
- High performance SCAF filters with variable band width 100hz to 2400hz
- Compact, truly portable, very low power drain (140ma @ 12v on receive)
- Built in iambic keyer
- 20 memories, Split, RIT

Now the features and performance you would expect in a full size rig are yours at half the size, half the price, and a tenth the power drain. You get the ability to sort out weak signals amid high power QRM; freedom from overload and precise filters. An *all band,* truly portable (5.5"Wx4"Hx6"D) compact, rugged transceiver whose low power drain means a weekend of use on a small battery.

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MFJ *HF/VHF* SWR Analyzer™ with RF Resistance Meter

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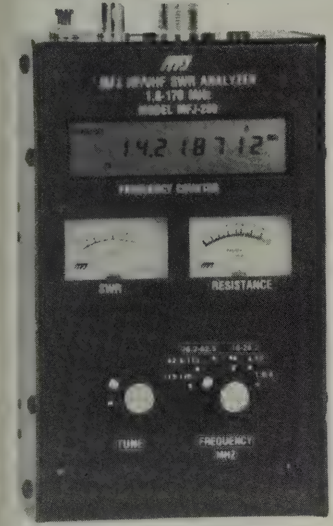

MFJ-259
$219⁹⁵

If you work with antennas, MFJ's revolutionary new *SWR Analyzer*™ is the best investment you'll ever make! Now you can diagnose a wide range of antenna problems instantly with one easy-to-use instrument.

What the MFJ-259 Does

The MFJ-259 gives you a complete picture of your antenna's performance anywhere between 1.8 and 170 MHz -- you can even check SWR outside the ham bands without violating FCC rules. Set the bandswitch and tune the dial--just like your transceiver. SWR is displayed instantly!

RF Resistance Meter™

Does 2:1 SWR mean 25 ohms or 100 ohms? *The new MFJ-259 tells you at a glance!*

Now you can measure RF resistance up to 500 ohms at minimum SWR -- instantly -- on MFJ's *exclusive* side-by-side RF Resistance and SWR Meters!

Take the guesswork out of building matching networks and baluns for your antennas.

Watch the effects of spacing on radiation resistance as you adjust your antenna.

Here's What You Can Do . . .

Find your antenna's true resonant frequency from the shack.

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Measure inductance, capacitance, resonant frequency of tuned circuits, transmission line velocity factor/impedance/loss.Test RF chokes, transformers, baluns.

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And this is only the beginning! The MFJ-259 is really *four* test instruments in one: an accurate RF signal generator, a high resolution 170 MHz frequency counter, *RF Resistance Meter*™ and an *SWR Analyzer*™.

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MFJ comprehensive 18 page instruction manual is packed with useful applications -- all explained in simple language you can understand!

For free manual write or call MFJ.

Take It Anywhere

The MFJ-259 is fully portable, powered internally by 8 AA batteries or 110 VAC with MFJ-1312B, $12.95. It's in a rugged all metal cabinet that's a compact 4x2½x6¾ inches. Take it to remote sites, up towers, on DX-peditions -- anywhere your antennas are located.

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How Good is the MFJ-259?

MFJ SWR Analyzers™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Professional installer and technicians use them worldwide.

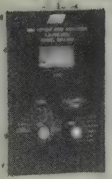
Get More by Paying Less

With the MFJ-259, you get full 1.8 to 170 MHz coverage, simple operation, instantaneous readings, a high accuracy frequency counter and MFJ's exclusive *RF Resistance Meter*™-- all for a low $219.95.

1.8-170 MHz *SWR Analyzers*™

MFJ-249
$199⁹⁵

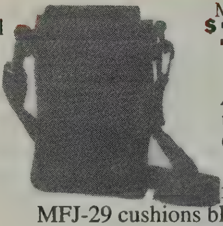
MFJ-249 *HF/VHF SWR Analyzer*™ has all the features of MFJ-259 but less RF resistance meter. Includes 1.8-170 MHz *continuous* coverage, 10-digit LCD frequency counter and smooth vernier tuning.



MFJ-209
$109⁹⁵

MFJ-209 *HF/VHF SWR Analyzer*™ is same as MFJ-259 without LCD frequency counter and RF resistance meter. Has jack for external frequency counter. MFJ-249/MFJ-209 are 4x2½x6¾ inches and uses 8 AA cells or 110 VAC with MFJ-1312B, $12.95.

Carrying Pouch



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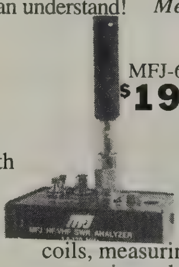
Tote your MFJ-249, MFJ-259 or MFJ-209 *SWR Analyzer*™ anywhere with the MFJ-29 custom Carrying Pouch.

Made with a special foam-filled fabric, the MFJ-29 cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work--the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Protect your investment and keep your analyzer safe and looking like new!

Dip Meter Adapter



MFJ-66
$19⁹⁵

Plug a dip meter coupling coil into your *MFJ SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter.

With a dip meter you'll save time and take the guesswork out of winding coils, measuring inductance and capacitance, measuring velocity factor and electrical lengths of coax. Determine resonant frequency of tuned circuits and measure Q of coils. Set of two coils cover 1.8-170 MHz depending on your *MFJ SWR Analyzer*™.

Free MFJ Catalog

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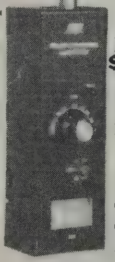
10-160M *SWR Analyzer*™

MFJ-207
$79⁹⁵

If you're an HF man, this compact MFJ-207 *HF SWR Analyzer*™ will help you build 10-160 Meters antennas that'll make working DX almost routine.

Just plug in your coax to find the SWR of any HF antenna on any ham band 10-160 Meters. Has jack for external frequency counter. 7½x2½x2¼ inches.

2 Meter *SWR Analyzer*™



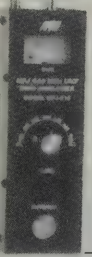
MFJ-208
$79⁹⁵

MFJ-208 2 Meter *VHF SWR Analyzer*™ finds the SWR of any antenna from 138-156 MHz. Jack for external frequency counter. 7½x2½x2¼ inches.

For Commercial VHF Radio

Same as MFJ-208 but for commercial VHF. **MFJ-217**, $79.95, covers 30-50 MHz and **MFJ-218**, $79.95, covers 150-170 MHz.

440 MHz *SWR Analyzer*™



MFJ-219
$99⁹⁵

Read SWR of any antenna 420 to 450 MHz -- just plug coax of your antenna into SO-239 connector, set frequency and read SWR. Uses microwave integrated circuits and microstrip technology. Jack for external frequency counter. 7½x2½x2¼ in.

MFJ-219N, $99.95, sames as MFJ-219 but with "N" connector.

Bandswitch Dip Meter™

MFJ-203
$99⁹⁵

The MFJ-203 is a sensitive *Bandswitched Dip Meter*™ that covers all hams bands from 160-10 Meters. There are no plug-in tuning coils to keep up with or break.

Has detachable coupling coil, dual FET oscillator, op-amp meter amplifier and jack for external frequency counter. 7½x2½x2¼ in.

MFJ Antenna Bridge

MFJ-204B
$79⁹⁵

Great for determining feedpoint resistance of antennas and for designing impedance matching networks. Measure RF resistance up to 500 ohm. Covers all ham bands 160-10 Meters. Built-in resistance bridge, null meter, tunable oscillator-driver, frequency counter jack. 7½x2½x2¼ inches. Use 9 volt battery or 110 VAC with MFJ-1312, $12.95

MFJ-219/218/217/208/207/203 uses 9 volt battery or 110 VAC with MFJ-1312B, $12.95.

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CIRCLE 1 ON READER SERVICE CARD

1996 (see fig. 3). This will be our biggest and best satellite yet. It will carry transponders with selectable RF sections for most bands between 21 MHz and 24 GHz, and run more power output to higher gain antennas than OSCAR 10 and 13 combined. Also aboard will be two experimental narrowband transponders for pioneering future digital communications formats. Life expectancy of this super satellite is 10 to 15 years.

Looking further into the future, the triple launch of three more super satellites as described in my May 1984 CQ "World of Ideas" column is still to come. The main stumbling block is financial support (donations to AMSAT keep the program going). These satellites are to be placed in geostationary orbit above the Atlantic, Pacific, and Indian oceans. They can be interlinked by ground control stations, and will provide full global communications on a continuous basis (see fig. 4). Needless to say, this trio will open yet another dimension in both satellite communications and amateur radio. If each of us contributes to this project, maybe it will become reality during the first or second decade of the 21st century.

Advancements in Printed Modes

During eras past **R**adio**T**ele**TY**pe was the mainstay of printed mode communications and one of the most popular areas of special interest in amateur radio. Its use of paper tape readers gave us the ability to send "canned" messages long before the advent of digital memory units, and RTTY's autostart systems were the unquestioned forerunners of today's personal mailbox setups. Although RTTY is still used today, its loss of ground to newer and computer-related modes such as AMTOR and packet is obvious in any quick tune across the HF bands. This advancement is good, but it also carries a feeling of loss to see RTTY (and its warm "clack-clack" sounds) fade in the annals of time. Sometimes progress stings.

AMTOR's two main advantages over RTTY are its integrated error correction system and semi break-in operation. That is, typed text is transmitted in short bursts and each is acknowledged by the receiving station (or automatically retransmitted until "ACKed") rather than being a solid key-down 100 percent transmission for five or ten minutes at a time. Packet's advantages are similar, plus its Bulletin Board Systems, personal mailboxes, continuously expanding levels of operation, and use on VHF and HF (at different speeds, naturally) make it extremely attractive to all licensees. Watch for even more growth in this mode during the future, and also watch for a voice-to-packet converter to really escalate its popularity (not all amateurs are super typists; talking is easier!).

Developments in SSTV

SSTV is another specialized mode that has undergone significant advancements since it was invented by Copthorn MacDonald during the 1950s. Indeed, it has progressed so far that new computer-equipped slow scanners may never know the thrill of seeing a classic old-style SSTV picture slowly trace down a long persistence P-7 screen. Nor may they experience the fun of using a Flying Spot Scanner rather than a camera. Ah, but today's 36 and 72 second multiframe color SSTV pictures are both beauties and technical marvels of their own that everyone appreciates.

Each year's developments in SSTV—the result of brilliant innovators converting their ideas into working models during winter months—debute at Dayton in the spring. Approximately fifteen years ago, for example, Dr. Don Miller, W9NTP, demonstrated the first color SSTV system and Dr. Robert Suding, W0LMD, wheeled in the first computerized SSTV system. A few years later W0LMD carted in a voice-interfaced (talking and listening) computer that did everything from controlling home lights and heat to working SSTV.

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If you won't settle for less . . . here is the finest 3 KW tuner money can buy!

The MFJ-989C is not for everyone.

However, if you make the investment, you'll get the finest 3 KW antenna tuner money can buy.

Here's why . . .

Massive Transmitting Capacitors

You get two *massive* 250 pf transmitting variable capacitors with detailed logging scales. They can handle *amps* of RF current and withstand 6000 RF volts because the plates are smoothed and polished and have extra wide spacing.

Precision Roller Inductor

A precision roller inductor, 3 digit turns counter and spinner knob gives you *exact* inductance control for absolute minimum SWR.

Ball bearings on steel shafts give you a velvet smooth vernier feel and long term durability.

You won't have arcing problems with this roller inductor. Firm springs put high pressure on a plated contact wheel for excellent electrical contact.

Wide, low inductance straps are used for high currents and a new core minimizes RF loss.

$\$349^{95}$
MFJ-989C

Cross-Needle Meter

You get a lighted *peak* and average reading Cross-Needle SWR/Wattmeter with 200 and 2000 watt ranges. Its new directional coupler gives you accurate readings from 1.8 to 30 MHz.

Super Heavy Duty Balun

You get a super heavy duty current balun for balanced lines. It has two giant $2^{1}/_{2}$ inch powder iron toroid cores and is wound with *Teflon®* wire connected to high voltage ceramic feedthru insulators. It lets you operate high power into balanced feedlines without core saturation or voltage breakdown.

Ceramic Antenna Switch

A two wafer 6 position *ceramic* antenna switch with extra large contacts gives you trouble free switching.

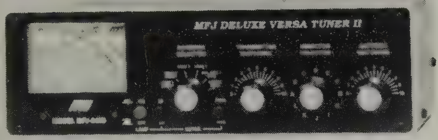
Plus much, much more

You also get a 300 watt dummy load, full one year *unconditional* guarantee, flip stand, all aluminum cabinet, tough baked on paint, locking compound on all nuts and bolts. 3 KW PEP. $10^{3}/_{4}$x$4^{1}/_{2}$x15 in.

Don't settle for less, get yours today!

More hams use MFJ tuners than all other tuners in the world!
Why settle for an imitation when you can have the real thing?

MFJ's *deluxe* 300 Watt Tuner



MFJ-949E
$\$139^{95}$

More hams use the MFJ-949E than any other antenna tuner in the world!

Why? Because you get proven reliability, the ability to match just about anything and a one year *unconditional* guarantee.

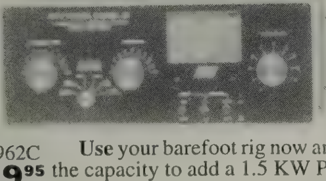
You get a lighted *peak* and average reading Cross-Needle SWR/wattmeter, antenna switch, 4:1 balun for balanced lines, 1.8-30 MHz coverage and a *full size* dummy load that easily handles 300 watts of abusive tune-up power.

New 8 position antenna switch lets you pre-tune into dummy load to minimize QRM.

The inductor switch is designed for high RF voltages and currents--it's not a *plastic* switch made for small signals and wired with *tiny* gauge wire.

Each MFJ-949E cabinet is chemically treated and has a new tough scratch-proof *vinyl* cladding -- not paint that can scratch or chip off. You won't find a tougher, longer lasting finish anywhere.

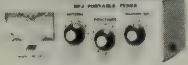
MFJ's *versatile* 1.5 KW Tuner



MFJ-962C
$\$229^{95}$

Use your barefoot rig now and have the capacity to add a 1.5 KW PEP amplifier later! Lighted Cross-Needle SWR/Wattmeter. 6 position antenna switch, *Teflon®* wound balun, ceramic feedthru insulators for balanced lines. 1.8-30 MHz. $10^{3}/_{4}$x$4^{1}/_{2}$x$14^{7}/_{8}$ in.

MFJ's *portable/QRP* Tuner



MFJ-971
$\$89^{95}$

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/*300 or 6 watt QRP* ranges. 6x$6^{1}/_{2}$x$2^{1}/_{2}$ in.

MFJ's *super value* Tuner

MFJ-941E
$\$109^{95}$

The new MFJ-941E gives you a 300 watt PEP tuner with *lighted* Cross-Needle Meter that covers everything from 1.8-30 MHz for an incredible $109.95.

Antenna switch selects 2 coax lines (direct or thru tuner), random wire, balanced line or external dummy load. 4:1 balun. 1000 volt capacitors.

2 Knob *Differential-T*™ Tuner

MFJ-986
$\$289^{95}$

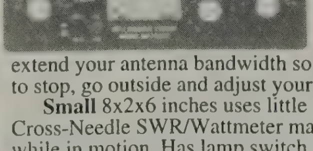
The MFJ-986 Differential-T™ 2 knob tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only one best setting. 3 KW PEP. 1.8-30 MHz.

Roller inductor makes tuning smooth and easy. Turns counter lets you quickly re-tune to frequency.

Lighted Cross-Needle Meter reads SWR/forward/reflected/*peak*/average power in 2 ranges. Current balun reduces feedline radiation and forces equal currents into unbalanced antennas.

MFJ's *mobile* Tuner

MFJ-945D $\$89^{95}$

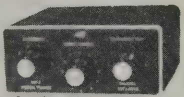


Don't leave home without this mobile tuner! Let the MFJ-945D extend your antenna bandwidth so you don't have to stop, go outside and adjust your mobile whip.

Small 8x2x6 inches uses little room. Lighted Cross-Needle SWR/Wattmeter makes tuning easy while in motion. Has lamp switch. 1.8-30 MHz. 300 watts PEP. **Mobile mount**, MFJ-20, $4.95.

MFJ's *smallest* Versa Tuner

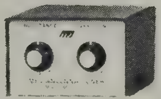
MFJ-901B
$\$59^{95}$



The MFJ-901B is our smallest --5x2x6 inches --(and most affordable) 200 watt PEP tuner -- when both your space and your budget is limited. Great for matching solid state rigs to linear amps.

MFJ's *random* wire Tuner

MFJ-16010
$\$39^{95}$



Operate all bands anywhere with any transceiver with the MFJ-16010. It lets you turn a random wire into a transmitting antenna. 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 inches.

MFJ's *VHF or UHF* Tuners

MFJ-921 or MFJ-924
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MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x$2^{1}/_{2}$x3 in. Simple 2-knob tuning for mobile or base.

MFJ's *artificial* RF Ground

MFJ-931
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Creates artificial RF ground. Eliminates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire.

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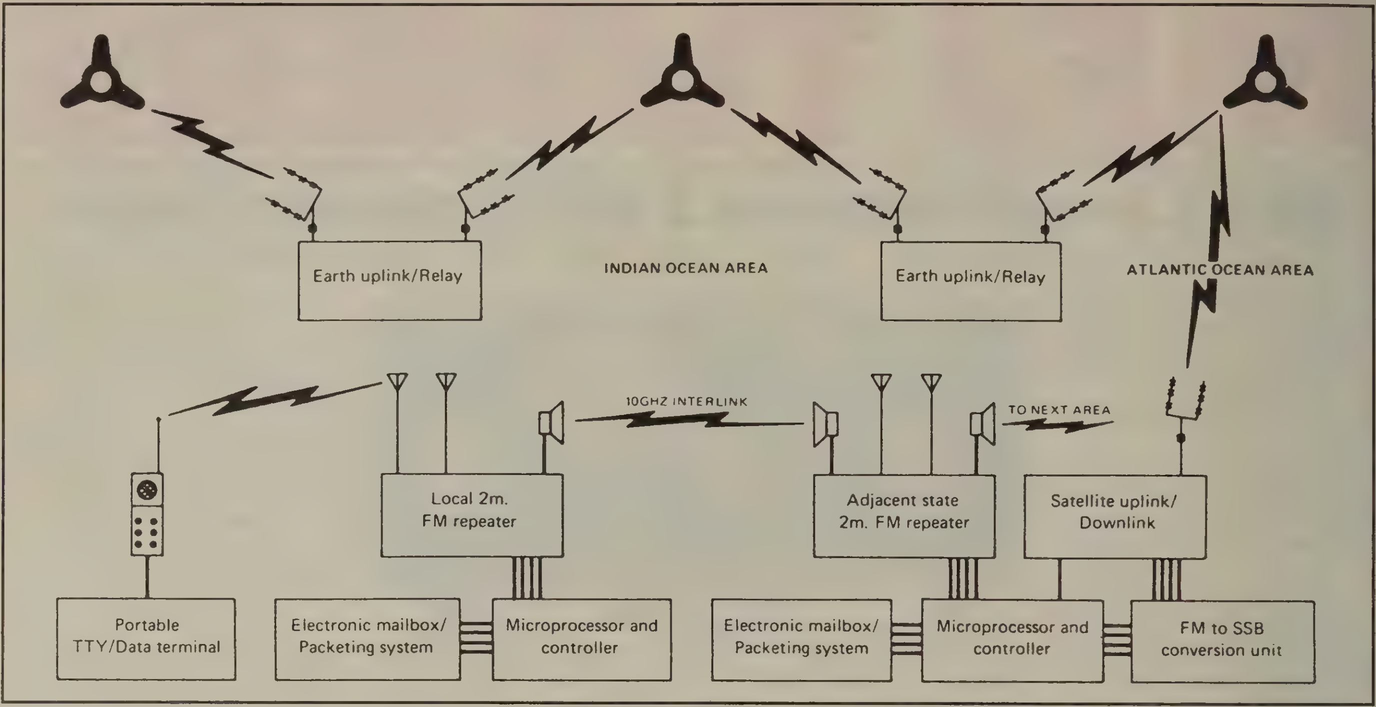
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Earth uplink/Relay
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Satellite uplink/ Downlink
Portable TTY/Data terminal
Electronic mailbox/ Packeting system
Microprocessor and controller
Electronic mailbox/ Packeting system
Microprocessor and controller
FM to SSB conversion unit

Fig. 4– A view of the future's triple-launched geostationary OSCAR "super satellites" which will provide full global communications on a continuous basis. Direction of communication/satellite interlinking can be selected by tuning up or down from center frequency range of a band.

Today W0LMD continues to set the technological pace by developing Virtual Reality for amateur radio use. Truly, this frontier is our most impressive area of video development!

Virtual Reality combines concepts of color TV, 3-D, and a viewing field of almost 360 degrees to simulate actually being at a distant transmitting site. You wear goggles (or in W0LMD's setup, a football helmet) equipped with miniature TV screens and optics for each eye. Built-in sensors detect straight ahead, up, down, left, and right head movements. Their outputs are used to call up corresponding angle views for display on the TV screens. When "visiting" another station via Virtual Reality, you can move your head and look around the shack and/or study various "goodies" rather than only see (TV views of) what the other operator shows you.

At the present time W0LMD has the only working Virtual Reality amateur radio setup. That means transmit/receive demos are limited to his QTH or meetings/forums such as the Dayton Hamvention. Companies in several countries have approached Dr. Suding about manufacturing Virtual Reality setups for SSTV and FSTV, but Robert's position is one of being the brains rather than the brawn in this frontier. The die has thus been cast. Imagine the possibilities in the future when amateurs around the world are equipped with Virtual Reality and prerecorded programs are plentiful. You could "walk" outside the distant station's QTH and admire antennas, quasi-browse through shops and stores abroad, enjoy watching a sunset from a South Pacific island, and more, just as if you were there.

A further explanation of Virtual Reality and illustration of its adaptation to amateur radio is shown in fig. 5. Let's begin this discussion with the transmitting station. A pair of regular color TV camcorders sitting side by side so their lens are 3 to 4 inches apart are used for 3-D viewing. Their (synchronized) positions are controlled/directed by nine servo motors, which in turn acquire their "movement info" via a slow-speed data link with the receiving station. In the meantime, video frames from the cameras are loaded into the transmitting station's computer and sent to the receiving station's computer via SSTV (or even FSTV on high bands). Computer storage of multiple viewing angles is more important in SSTV, incidentally, whereas real-time Virtual Reality using two UHF frequencies is possible with FSTV.

Now let's focus on the receiving station. First incoming video is converted to data and multiple frames are stored in the computer. Desired-angle frames specified by sensors are then directed to the (two) TV/monitor/screens. Sensor data (zoom, pan, tilt requests) is also computer-processed and sent back to the transmitting station via the previously mentioned slow-speed data link. At this point you are asking how the HF transceiver transmits and receives simultaneously, right? Remember fig. 5 shows a condensed block diagram. Actually, three transceivers are used. One transmits left eye info, one transmits right eye info, and one receives "movement info" (alternately, use of Independent SideBand Transmission can reduce transceiver count to two). Now look at the concept overall, and imagine being the viewer/Virtual Reality user. As you turn your head, cameras at the distant (transmitting) station move accordingly (unless a large prerecorded program is used).

Professional Virtual Reality systems can cost thousands of dollars, but once again W0LMD illustrates how creative amateur radio tinkering can cut that figure to one thousand dollars. His "goggles," for example, use an old football helmet as a framework. Inside, a pair of Hershel optical wedges obtained at low cost from Edmund Scientific split eye views to left and right TV screens. The LCD "screens" in turn are simple Radio Shack color TVs stripped of batteries, speakers, tuners, etc., and thus weigh only 3 ounces. The sensors are 1½ inch pill bottles pierced by 5 pins and half-filled with Log Cabin syrup (which changes pin-to-pin resistance with movements). Amateur homebrewing ingenuity is still alive!

Virtual Reality is in SSTV's future, and it is one more good reason for joining SSTV fun today. As an inspirational beginning, tune in the SSTV net that meets Saturdays at 1800 GMT on 14.230 MHz. Net control Brooks, W1JKF, is a real pro (approxi-

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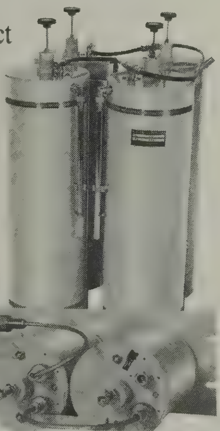

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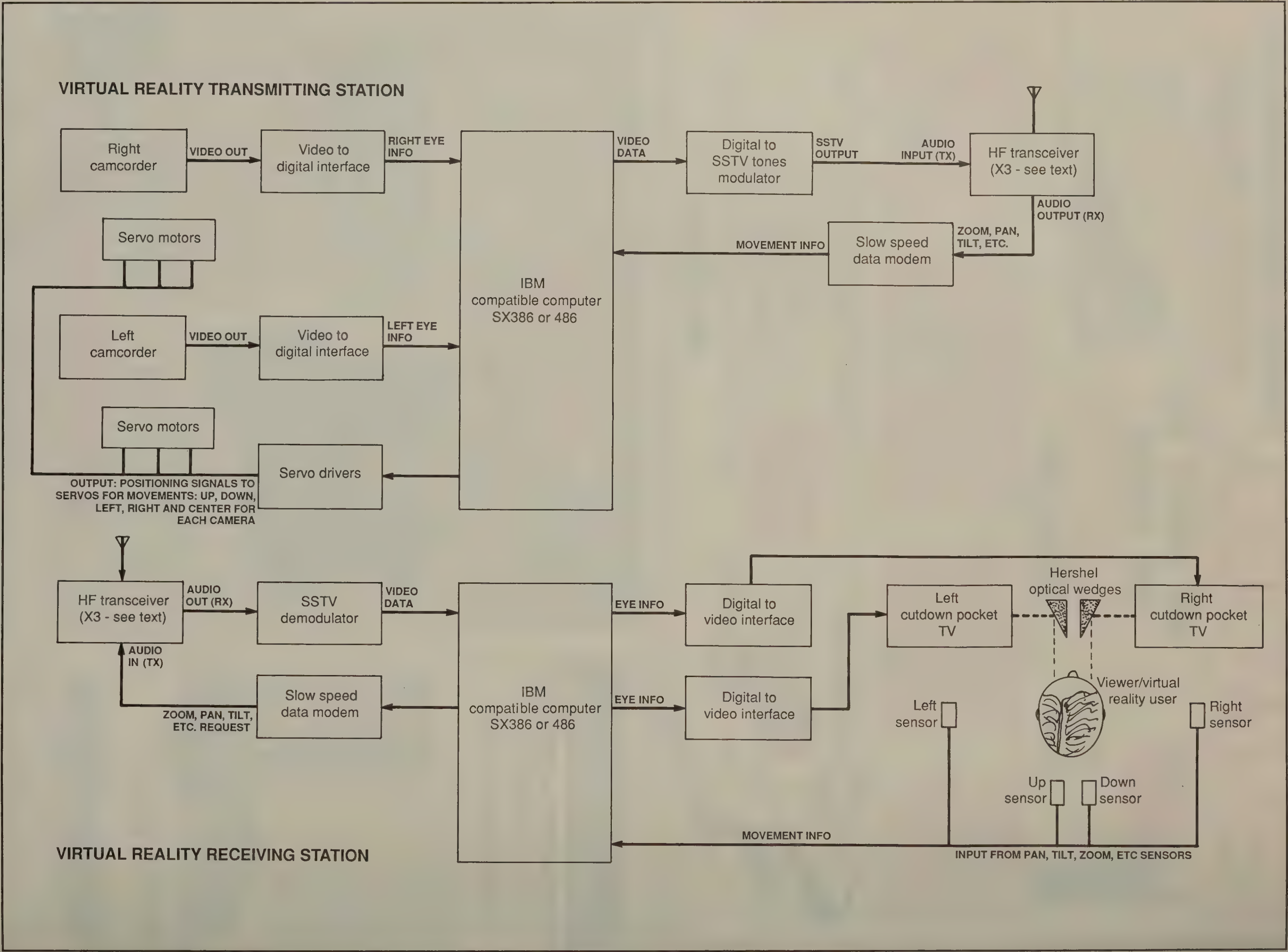
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Video to digital interface
RIGHT EYE INFO
Servo motors
Left camcorder
VIDEO OUT
Video to digital interface
LEFT EYE INFO
Servo motors
Servo drivers
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Digital to SSTV tones modulator
SSTV OUTPUT
AUDIO INPUT (TX)
HF transceiver (X3 - see text)
AUDIO OUTPUT (RX)
ZOOM, PAN, TILT, ETC.
Slow speed data modem
MOVEMENT INFO
VIRTUAL REALITY RECEIVING STATION
HF transceiver (X3 - see text)
AUDIO OUT (RX)
SSTV demodulator
VIDEO DATA
AUDIO IN (TX)
Slow speed data modem
ZOOM, PAN, TILT, ETC. REQUEST
IBM compatible computer SX386 or 486
EYE INFO
Digital to video interface
EYE INFO
Digital to video interface
Left cutdown pocket TV
Hershel optical wedges
Right cutdown pocket TV
Viewer/virtual reality user
Left sensor
Right sensor
Up sensor
Down sensor
MOVEMENT INFO
INPUT FROM PAN, TILT, ZOOM, ETC SENSORS

◄ *Fig. 5– Condensed block diagram of Virtual Reality via SSTV system for amateur radio use. System designed by WØLMD. (See discussion in text.)*

mately 20 years on the job), and call-in SSTVers are always helpful to newcomers.

Progress in Licensing

Considering all the previously discussed technological advancements, you would think we have also planned ahead and taken ample steps to ensure the longevity of amateur radio for future generations, right? Wrong! The fact is, amateur radio may cease to exist in the good old USA within our own lifetimes unless some licensing changes/amendments are made—and soon! Now I ask you, what good is working rare DX, IOTA expeditioning, winning contests, etc., if there is no one to appreciate those accomplishments one or two generations later. Is it really logical to age ourselves into extinction with strict criteria justified by "I did it, therefore so should newcomers"? I am talking about Morse code restrictions, but don't jump to premature opinions (or stop reading because "it doesn't affect you").

I operate CW 90 percent of the time and love it. When mobiling I often forget to even carry along a microphone. At home I use pump keys, bugs, paddles, and miniatures. I send with either hand (or both hands!), cross hands, and send with a bug in one hand and a paddle in the other, behind me, simultaneously (Honest! It's fun!). However, I don't think such dedication to Morse code operation should be forced on others.

Since today's generations are growing up with computers, whereas we grew up with keys, and 13 wpm is well beyond the 10 wpm Morse plateau, reducing code speed requirements (or allowing use of readers) for a General license is past due. Bad idea? Maybe you would like the tables turned/updated so we (that is, you and I!) would have to pass a computer test of typing 100 wpm. That should clean QRM off the bands! Realizing our dilemma, then combining our numbers with industry supporters, is the first corrective step. Encouraging the change and explaining its benefits in meetings with ARRL section directors and in industry meetings is the next step. Opinions?

We have totally cleaned out available column space for this month. I will thus again congratulate *CQ* on a great 50th and invite everyone to chat with us further on the air. Letters? Include an SASE, please, and be patient for a brief reply. I still frequent 30 CW weeknights and 14.180 to 14.225 MHz Sundays from 2300–2330 GMT.

73, Dave, K4TWJ

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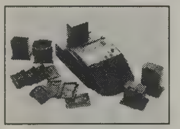

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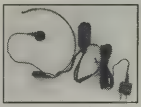

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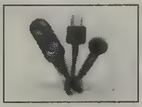

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MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

Down Memory Lane

"While discussing the new growing breed of 'appliance operators' at the offices of *CQ* magazine, the idea arose for a column that would perhaps spark a return to the 'good old days' when just about all hams were avid experimenters and rare indeed was the shack without some homebrew equipment. After discussing the topic for some time, the format and content for such a column slowly developed, and being an advocate of more home-built or modified equipment, I volunteered to take the job."

So began the first installment of "Math's Notes" in the April 1972 issue of *CQ* magazine. From a couple of little rooms in the basement of an office building on Vanderventer Avenue in pretty Port Washington, New York, *CQ* magazine has evolved into CQ Communications, Inc., a significant "voice" in amateur radio. With the guidance, support, and commitment of people such as Dick Ross, K2MGA, and Alan Dorhoffer, K2EEK, I am sure it will continue to be such a voice for as long as amateur radio exists as a viable hobby. As an entrepreneur myself, I can fully understand and appreciate the vast amount of work and personal commitment it has taken to reach this point.

From time to time I think about those "old" days (and sometimes even "older" days). Heathkit, Hallicrafters, National Radio, Collins, and Gonset as well as a host of others were going strong. Almost everyone was converting World War II Command Sets into VFOs, semiconductors still had 1N- and 2N- designations, and man had just walked on the moon. The personal-computer revolution had not yet quite started, and if you asked for a 12AX7 or a 6BQ6, the electronic parts dealer didn't think you were crazy. Homebrewers were widespread when "Math's Notes" started, but there were clear signs that their ranks were beginning to diminish. That was why the column was initiated—to try to introduce newcomers to the joys and personal satisfaction of electronic experimentation, and to try to convince old-timers to continue in this endeavor. Hopefully, we have had a measure of success in this area over the years.

The old-timers who live in the New York City area I am sure will remember the heyday of "Radio Row," a huge collection of WW II surplus outlets that encompassed the area from Cortland Street (where the World Trade Center buildings now stand), along many of the side streets, all the way up to the western portion of Canal Street. At the time almost anything that was manufactured for the war effort (and had copper wire in it) was available over the counter at prices of a few cents on the dollar. Just about all of my initial experimenting with radio and electronics started with surplus electronic equipment and components which I purchased there and often literally "dragged home" on the subway. When I think about it now, it was amazing just how much "vital equipment" and high-quality military-grade components I actually did acquire on my very limited allowance at the time.

A few weeks ago my teenage son wanted a new backpack for school, and since I knew that the W WII army version would be strong enough to last for the rest of his life, I decided to take him and revisit my old "stomping grounds" to see if we could still find one. Although I had not been in the area for more than 30 years, I was positive that we would not be disappointed.

Upon arriving at Canal Street (Cortland Street and most of the side streets really don't count anymore), I immediately noticed that as in the past, the throngs of people were still there. The sidewalk displays were there too, but the merchandise had almost completely changed. True, you could still buy bargain hardware items such as tools, tape, outlet strips, plastic, foam rubber, and assorted junk from one or two places, but the front section of an airplane, the selection of vacuum tubes (VTs as well as more conventional numbers), transformers, bins of FT-243 crystals (20 for a dollar), gyro assemblies, panel meters, and "demilitarized" bazooka shells were nowhere to be seen. The stores that used to be chock full of old radios, "Hi-Fi" equipment, TVs and military transmitters, receivers, and electronic and mechanical assemblies of all kinds were simply gone. They had been replaced by clothing shops, people selling copies of women's designer handbags for a few dollars, "$10,000 Rolex wristwatches" for $10 to $15 each (obviously also copies), and electronic emporiums selling monster speakers and what looked like "million watt" amplifiers. The hundreds of boxes of war surplus items had turned into a few boxes of scrap computer boards, broken remote-control toys, and appliances with brand names I had never heard of. Nothing except the buildings themselves remained. WW II on Canal Street was over.

I did not really notice all this, however. As I walked the entire length of the street, I remembered many of my happy excursions in the past between Cortland and Canal. Familiar names such as G&G Radio (where I bought my first DuMont oscilloscope), Leo-tone, Edlie Electronics, Blan The Relay Man, "Harvey and Harrison Radio, and a myriad of others came to mind as I passed various buildings. Alas, though, these now remain only in my imagination. I must admit that a tear came to my eye more than once.

The spirit of building and experimenting that started in lower New York City has never left me, however. As I think about it, the original intent of "Math's Notes" is as valid today as it was in 1972. I am convinced that there will always be something that amateurs will be able to contribute to technology; only the techniques and components will change. But even if technological advances are not one's particular forte, the thrill of communicating with someone via equipment built with one's own hands (even if it is only a connector soldered to the end of a microphone cord) is an accomplishment that I don't think can ever be equalled, no matter how much money is spent on a "state-of-the-art" commercially manufactured "appliance." As a result, I just want to say that I truly hope the pioneering spirit that was and is amateur radio never dies. By the way, we did find the backpack, but that's an entirely different story.

At this time I would like to wish Dick, Alan, and the entire *CQ* staff many, many more years of success. I would also like to express my sincere thanks for the support and friendship we have enjoyed for more than 25 years.

To all of my loyal readers, a very happy and healthy New Year, and the most sincere of thanks for all of your letters, comments, and good wishes over the years. Please continue to keep them coming. They mean a great deal to me. Thank you also for bearing with me on my trip down "Memory Lane." I wish you all similar fond memories.

73, Irwin, WA2NDM

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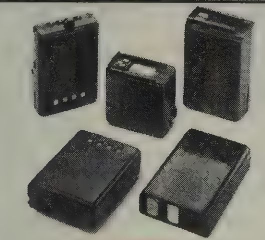

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PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

From Morse Code To Packet—Then and Now

There was click and clack. These were the sounds of a Morse code "sounder" made up of an open-frame relay with a Prince Albert tobacco tin attached to amplify the sound. The dots and dashes were not continuous wave broken by the usual key up, key down sequences. The dots and dashes in this case were created by the time period (measured by the human ear) between the click and the clack of the sounder.

As a kid I sat for hours and watched the operator at the L&N railroad depot in Attalla, Alabama send and receive messages to and from other operator's at other railroad terminals along the line. Not only was he writing the code as he received it, with his right hand, he was relaying the same text along to the next operator, using his left hand. What I was watching was just one step away from a phenomenon. These are some of the childhood activities that influenced my desire to enter the hobby of amateur radio and eventually the professional field of communications.

My initiation into amateur radio was unlike any experience I've ever known. Some of the amateurs of the Gadsden, Alabama Amateur Radio Club (W4YPC, W4EBO, W4CWF, W4CFB, W4DXO, and W4PAC, among others) set about teaching me the code and theory that would lead to my becoming an amateur radio operator.

Our country home near Hokes Bluff, Alabama had recently been wired for electricity. One of the first attachments that was made to that old 60 amp 110 volt AC "fuse box" (Breaker panel? Are you kidding?!) was a duplex connection into the barn where my first (Atwater-Kent chassis) transmitter was located. My first receiver was a Sky Buddy by Hallicrafters. Each morning I looked forward to warming up the homebrew 807 (final) driven by a metal 6AG7 (oscillator) transmitter and the Sky Buddy receiver. Each contact was a thrilling moment to savor for eternity.

The verbal description here is of my continuous-wave transmitter. As long ago as I can remember, the late 1940s and early '50s, there was an acronym for it—CW. Today this acronym continues to be accepted as the reference for the use of international or Morse code.

In many ways packet radio and CW are related. The relationship may not be clear at first glance, however. With a closer look though at the CW method of current ON current OFF, and the packet method of mark and space, logic 1 and logic zero, we begin to see the relationship between the two.

I'm not going to reach into a historical time-warp and open the past that brought us through an evolutionary sprial leading us all the way from CW into our world of packet radio. Just for the record, radio telegraph (RTTY) was the mode that followed CW. Then came AMTOR, and ultimately packet radio.

In a hobby that is forging ahead as swiftly as is packet radio, we sometimes fail to examine the building blocks that were used in its conception. Here in the 1990s we continue to experience the fastest growing facet of amateur radio ever—packet radio.

For a moment indulge yourself in a short history lesson. I promise to be brief, and I won't take you to the edge of boredom with unnecessary background. Besides, I'm telling this story for your benefit and to whet your appetite for a slice of the packet radio pie.

So What Is Packet?

Packet is the opening word of the next amateur club meeting. Packet will be the topic of discussion at the next hamfest you attend, regardless of how much you try to avoid it. Packet *is* digital communications! Yes, packet radio is the keystone of the foundation for our communications future.

Packet radio will transfer just about any medium we can digitize. Whether the data is in binary or ASCII form, we can send it via packet radio. Unlike radio teletype, CW, and AMTOR, packet is sent in packets.

A packet is a burst of letters or data information which is sent in groups of 128 or 256 characters (AX-25), or much longer packets with other protocols. Along with each packet is an error-check method which assures the safe delivery of each and every packet. I will more fully explain the "packet" later.

The First "Coded" Data

There are many beginnings to our modern-day packet concept. The beginnings to which I subscribe most are those which support the early digital data transfer. Somehow I have to relate digital data to the very first communication methods because of the "coding" of each word or symbol. Being one-eighth Cherokee Indian (some Irish, Norwegian, and German, too—what a melting pot!), I'm referring to "smoke signals"! Can you imagine one of my ancestors (an Indian communications officer with good eyesight) on a remote mountaintop passing traffic to a neighboring tribe some 40 miles distant? If we go a bit further, we could even imagine what would happen if he were to make a mistake sending one of the words or symbols. I only hope he didn't use the same method we use in CW to indicate an error (di di di di di di di dit). If so, he would fan his smoke bank into a full-fledged forest fire.

So what's the point of my illustration? Here is why I relate these first digital puffs to packet—with one difference. Right up front we must ensure that no errors are sent in the first place. Enter X.25 packets!

The smoke signals (and CW) were not perfect as sent. With packet, however, we have forward error checking all along the route. The end result is this: No packet is delivered to the end user until all errors are removed, and the packet is an exact replica of the original data.

The next step in symbolized data transfer might have been in 1753, when a Swiss inventor proposed stringing 26 wires (one for each letter of the alphabet) from town to town. The prototype worked, but the idea faltered, since there were no wire makers courageous enough to undertake a wire-making task of this magnitude in 1753.

Most of us know something about the next significant step in data communications, which occurred in the early 19th century. Samuel F. B. Morse, an American, had suddenly brought data com-

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munications into the real world, which was in need of a better and faster communications method. It is purported that Morse had the telegraph operating in 1832, but news of its existence did not become well known until he delivered the message "What hath God wrought?" from Washington to Baltimore in 1844.

Many a good CW operator has turned away from packet only because it is something new and different. Little do they realize that CW, or telegraphy, actually marked the beginning of our modern-day packet radio. In truth, this two-state coding represents an ON/OFF, positive/negative, and key up/key down action. This action is the basis of our two-state binary system.

If you are a CW operator, it's called "key up and key down." If you are an RTTY operator, it's called "mark and space." As you move into packet, the state remains the same, but the designator changes to ones and zeros. No longer are the sentences and phrases measured in "words per minute" (WPM). They now are packets, measured in bits per second (BPS).

Those of us who are 50-year CW operators have no need to feel threatened by this new kid on the block, as we are the very group who helped bring this kid into existence.

Every communications system we use in amateur radio has had some form of interface. Some were crude and some were complex. Each time we advance our mode of communications, we also advance the complexity of the interface—from the hand key for CW to the automatic keyers, from the current-on current-off, motorized teletype terminals to the dot matrix and laser printers with touch key terminals.

Enter The '60s

It appears that many of today's standards and codes were developed and implemented in the '60s. The giant steps in digital data transfer advanced in quantum leaps with the Rand Corporation starting in about 1964. This was the beginning of the ARPANET packet switching network. Most of these networks were over cable or "closed environments."

Packet communications received the first boost into its beginnings in 1964 when the Rand Corporation received funding from the United States government to develop a means to distribute data and information through a network of terminals and mainframes. Most of the early packet communications were more terminal to terminal than terminal to host. As this infant grew, a more sophisticated

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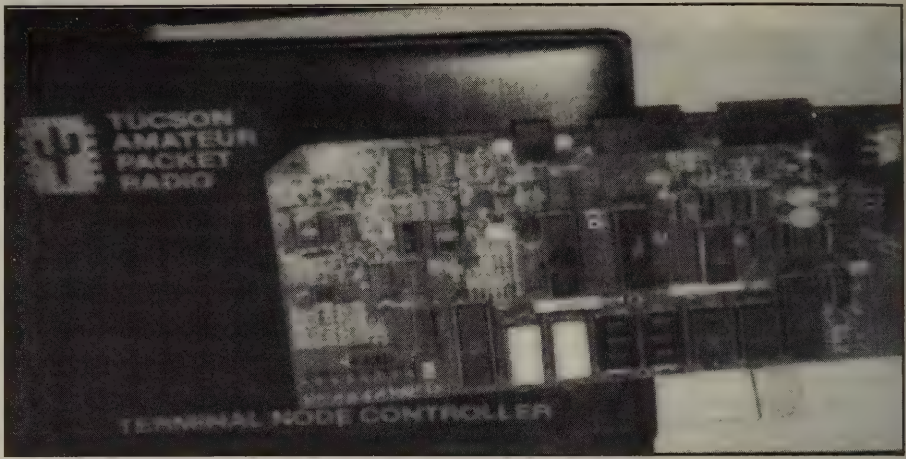

In the early 1980s I purchased and assembled this TAPR TNC1, which I still have today.

protocol evolved. A crude form of error detection and correction was added, along with character, frame, and block checking. Much of this was done by different developers, and each protocol had its own "personality."

In the early amateur radio packet assemblers/dissassemblers, the HDLC protocol was derived from the Vancouver Digital Communications Group. More details about this protocol may be found in notes by Hank Magnuski, KA6M. These reference notes are available from the Tucson Amateur Packet Radio group (TAPR). If you write to them, ask for the notes by KA6M dated August 15, 1981.

Enter The '70s

In the early '70s at the University of Hawaii the ALOHANET began. This was a wireless packet radio network. The terminal control units, or TCUs, were the forerunners of the packet assembler/disassembler (PAD), now known as the terminal node controller (TNC).

In 1975 a grand and glorious gathering of the minds took place in Canada. The communications experts from the United Kingdom, Canada, and the United States gathered to lay the groundwork for a standard of compiling and distributing information. The symposium was sponsored by the IEEE and other prominent organizations. The "standard" which evolved fron this meeting became known as the "Vancouver protocol." The basic framework of this protocol is still a part of the X.25 packet switched network.

Since much of the funding for the building blocks of this protocol was from the government, it came as no surprise that the United States Department of Defense was the first user of a packet-switched network. ARPANET (Advanced Research Projects Agency) is still in use today, although it is not the only packet-switched network in use today. In today's packet network environment we can't begin to list the many packet-data networks.

Enter The '80s

Packet radio networks took a strong leap into the 1980s. Suddenly everyone who had data or information to exchange, sell, convey, manipulate, or develop was calling for a packet network. At first it was in the small office for bookkeeping, then the larger office, and later it moved into the corporate and manufacturing processes.

Local area networks (LANs) began showing up. AT&T, who had utilized packet switching for many years and had contributed so much to the development of the X.25 protocol, suddenly found themselves in the middle of a mass requirement to tie many of these LANs into nationwide networks. Networking has found its way into the home, the automobile, and just about every facet of human endeavor. Packet now plays a large role in our day to day lives. It is opening many avenues to the world, with worlds of communications posibilities.

My knowledge comes first hand, as I was a member of the engineering and design team that implemented the first of many wide area networks (WANs), and I later was instrumental in the design of the first global information network (GIN).

As I write these pages, there are protocols being developed within the packet system which transfer high-resolution color pictures, digitized voice, and electronic mail with full motion graphics included. Following I will cover some of the modes of packet communications.

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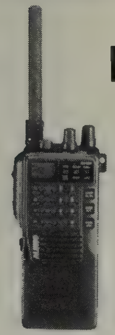

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AX.25, The Amateur Radio X.25

At this point we learn the orgin of packet radio's AX.25 protocol as related to X.25. The "A" prefix is the change applied to the original X.25 protocol when it was applied to amateur radio. I'll explain.

These protocol changes enabled the callsign of the amateur station to be included with each packet sent and received. Other changes were added for compatibility and radio interfacing purposes. AX.25 is the amateur version of the X.25 protocol.

It would appear that AX.25 and packet radio have become synonymous. However, this is not the case. As FM is to voice, is AX.25 to packet. SSB and AM are attributes of voice also. AX.25 in a way carries the same relationship to packet. A term which used to be reserved for the amateur to describe a mode of communicating, "packet" is now a household word.

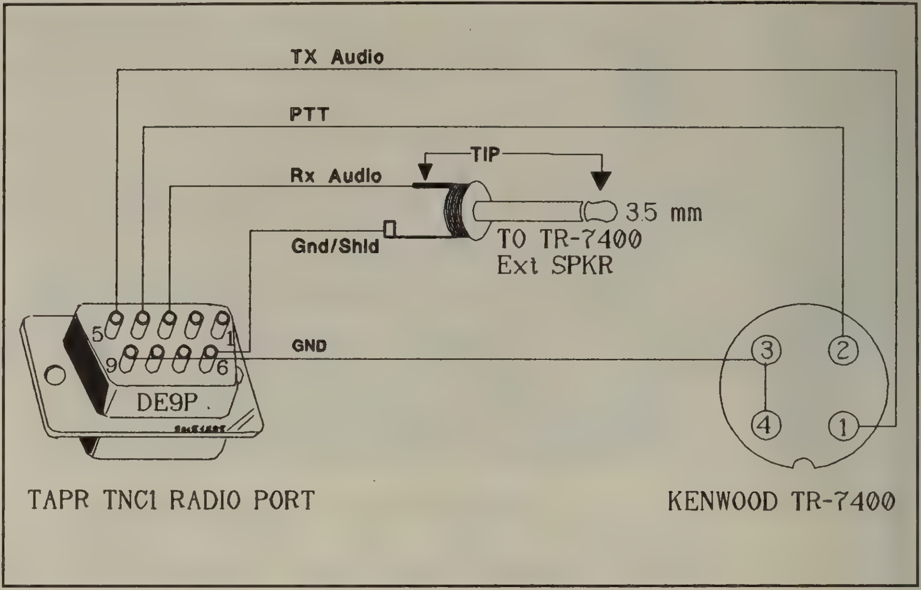


Fig. 1– Interface cable wiring for the original TAPR TNC1 and the Kenwood TR-7400 transceiver. Receive audio is extracted via the 3.5 mm external speaker jack. Note pins 6, 7, 8, and 9 are connected to the negative bus in the TNC1. This serves as the "common" ground return for the push-to-talk, the receive audio, and the transmit AFSK lines.

What Is A Packet?

A packet consists of a frame. This frame in some respects is similar to a letter. Inside this letter we have placed several notes and sent the letter to a group of people. These notes, or data, were all typed on the same word processor. The notes, although addressed to different persons, will play a similar role by giving each one specific instructions all related to the same subject.

Each recipient is asked to come to a meeting (synchronization) at a specific location (address field). One person is asked to look over the enclosed information, and if any errors are found, the contents should be returned to the sender via a given route for correction prior to the meeting (error detection and control information). Finally, this message or letter must be delivered by the special messenger to a specific location and given to each person in his or her department (packet assembler/disassembler [PAD], now called the terminal node controller [TNC]).

Just Over A Decade Ago

All this fun, called packet radio, began just over a decade ago. Packet radio has made its grand entry into amateur radio, and has become one of the most advanced and fastest growing facets of our hobby.

In 1983 there were a handful of packet radio users in the southeast, and that was counting the fingers of both hands. Today the numbers are multiples of 100,000 and increasing every day. There were very few packeteers in Georgia and Alabama in 1983—to be exact, Wayne, WD4LYV, and myself. Wayne was using one of the first versions of the TAPR packet assembler/disassembler. I was using a crude version of a modem/controller board, which I had purchased while attending school in Thousand Oaks, California. The relic I used in those days had been known by several names such as the Canadian board, the Vancouver Amateur Digital Controller board (VADC), and a few names I gave it when it malfunctioned—and that was a daily occurrence.

Because of the hardware and firmware limitations and differences in the VADCG PAD, I purchased a Tucson Amateur Packet Radio (TAPR) TNC1. I still have the old TNC1 (shown in the photo), and it works just as well as when I assembled it. Fig. 1 illustrates how I interfaced the TNC1 to my TR-7400.

In the early days of packet I would call Wayne on the phone (he lived over 100 miles away) and ask him to get on packet. Sometimes we would try a packet connect for 15 or 20 minutes before we would get a "CONNECTED TO:" with one another. As time went on we acquired power amplifiers and better antennas. Before long we had a decent path and enjoyed many a good packet session. It soon became apparent to us that other amateurs were monitoring the frequency.

Many would simply listen; others would talk to the invisible noise and say things such as "Whoever you are making the funny noises, you are on an amateur radio frequency and that is illegal stuff you're sending." Some would even threaten to call the FCC. My 2 meter rig was hardwired into the Terminal Node Controller (TNC), so access to voice was futile. The frequency we were using in 1983 was 145.050 MHz.

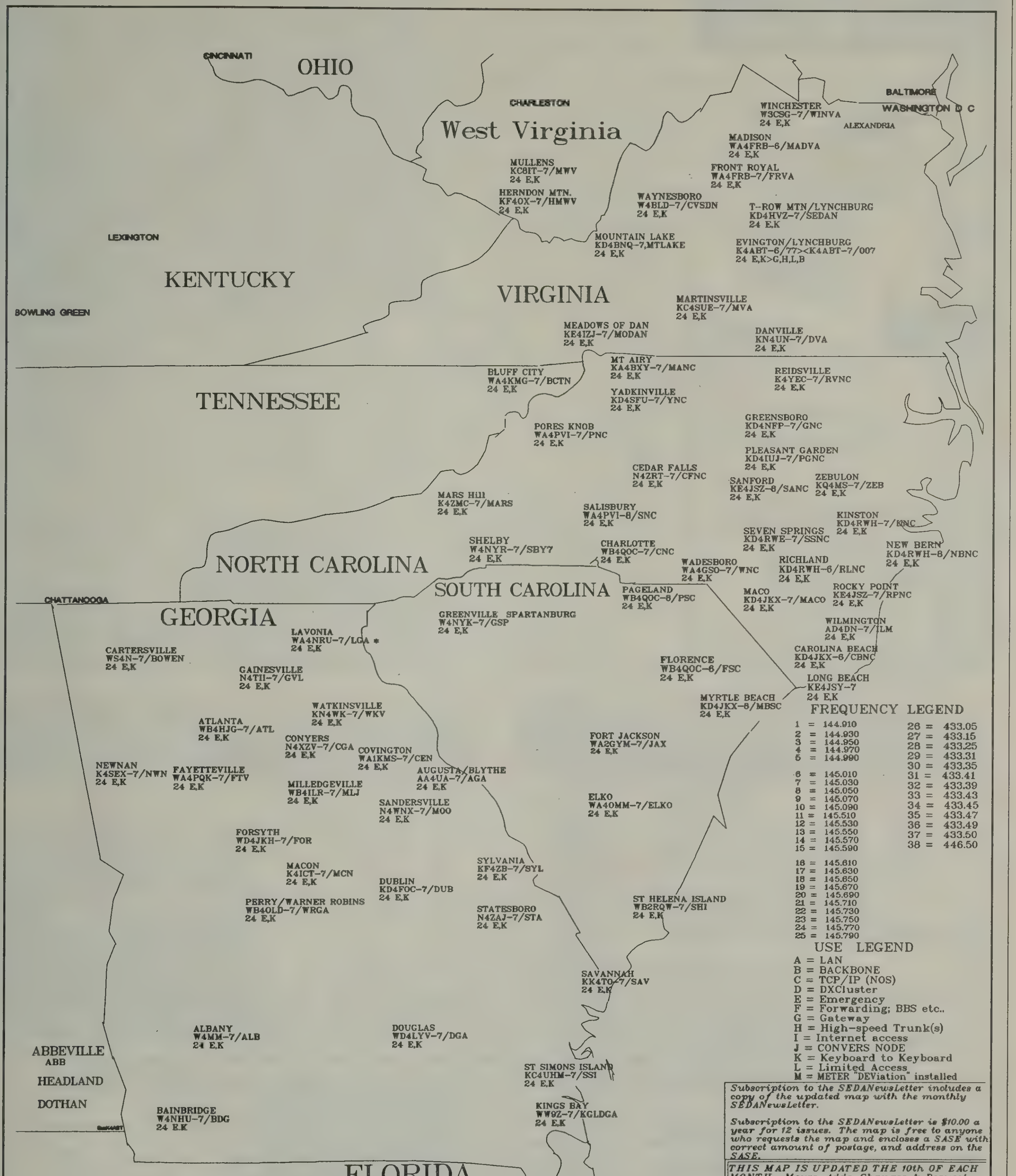
One day while listening to the mobile I overheard another friend talking on the local voice repeater about the strange noise on 145.050 MHz. It was George, N4AGO. I asked him to stop by my QTH so I could explain packet, the source of the strange noise he was hearing.

A New Day in Amateur Radio

When I turned into my driveway, there was George, and several other local amateurs who wanted to know more about the "strange noise." It seems there was more interest in packet than I had anticipated.

This same senario was happening in all parts of our country. Little did we know then that a hobby within a hobby was emerging. The packet communications "hobby" was in place, and now it is changing amateur radio into a beautiful butterfly.

Computer users and hackers are taking a closer look at amateur radio. Amateur radio has never offered so much. Suddenly, here is an open door for many new amateurs. Add to packet radio the inducement of Novice enhancement and the no-code license, and you have the



FREQUENCY LEGEND

1 = 144.910
2 = 144.930
3 = 144.950
4 = 144.970
5 = 144.990

6 = 145.010
7 = 145.030
8 = 145.050
9 = 145.070
10 = 145.090
11 = 145.510
12 = 145.530
13 = 145.550
14 = 145.570
15 = 145.590

16 = 145.610
17 = 145.630
18 = 145.650
19 = 145.670
20 = 145.690
21 = 145.710
22 = 145.730
23 = 145.750
24 = 145.770
25 = 145.790

26 = 433.05
27 = 433.15
28 = 433.25
29 = 433.31
30 = 433.35
31 = 433.41
32 = 433.39
33 = 433.43
34 = 433.45
35 = 433.47
36 = 433.49
37 = 433.50
38 = 446.50

USE LEGEND

A = LAN
B = BACKBONE
C = TCP/IP (NOS)
D = DXCluster
E = Emergency
F = Forwarding; BBS etc..
G = Gateway
H = High-speed Trunk(s)
I = Internet access
J = CONVERS NODE
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Fig. 2– The SouthEast Digital Association Networks (SEDAN) map.

recipe for renewed growth in what otherwise was a withering hobby.

Not so long ago there were comments about the loss of amateurs from our ranks. There were more Silent Keys than there was young blood entering the ranks of amateur radio. This caused much concern about the future of amateur radio. Now, however, it all has come together. Packet radio, volunteer examiners, Novice enhancement, and no-code privileges have given amateur radio the "shot in the arm" that it needed.

Packet has grown so fast that it is difficult at times to make a long-haul 500 mile contact on VHF packet. In a giant step to alleviate this problem we found our solice in higher baudrates (9600, 19,200, and 38,400 baud) and in the UHF spectrum. We now can have our cake and eat it, too.

The high-speed (above 9600 baud) "backbones," or trunks, are being built on these bands and are already proving to be a good choice for moving the long-haul data from city to city. New techniques and equipment are appearing in the amateur radio digital marketplace. There is a renewed interest in the 220 MHz band for development of a nationwide high-speed trunking, 64 kB network.

Packet radio has made the dramatic transition for the digital-minded amateur. No longer is the VHF and UHF transceiver confined to the local voice repeater. The communications range of these transceivers is limited only by the lack of information about which path of digital repeater network (nodes) to use. An example is illustrated in the SouthEast Digital Association Networks (SEDAN) map in fig. 2.

We have arrived, and I am proud to be a part of such an innovative medium. This is digital communications in its most superb form, and there is no limit to what can be sent via packet radio. Anything we think about can be digitized—data (binary or ASCII), voice, music, pictures, and the list goes on. Given time we may someday even digitize matter—"Beam me up, Scottie."

We have embarked upon the threshold which leads into one of the greatest communication mediums available to the fraternity of amateur radio and mankind. Packet radio enables you to join me and countless thousands as we further develop the "information super highway" and the communications stargate into the future.

Happy Packeting!

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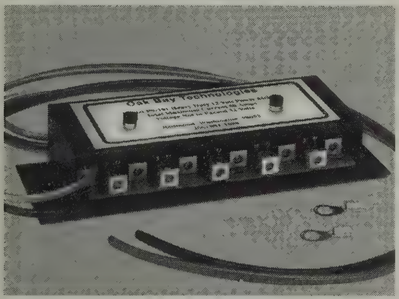

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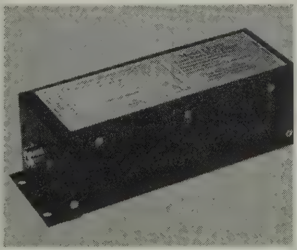

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CQ Showcase

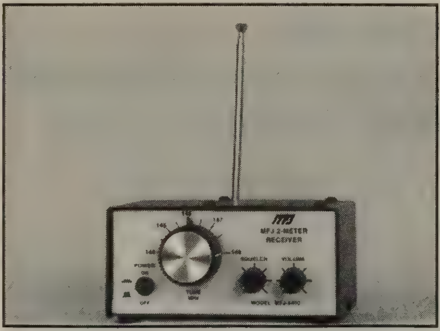
AEA PC PakRatt for Windows Version 2.0

Advanced Electronic Applications, Inc. (AEA) is now offering version 2.0 of the PC PakRatt for Windows computer program. PC PakRatt for Windows 2.0 is a Windows application for controlling the AEA family of data controllers. The program can run two AEA data controllers simultaneously, and run HF or VHF packet, AMTOR, BAUDOT, Morse code, ASCII, Signal Analysis, NAVTEX, PACTOR, or Dumb Terminal modes. PC PakRatt for Windows 2.0 is now fully compatible with Log Windows 2.0. Other features include a Packet Monitor Window for displaying monitored packets, custom parameters for 9600 bps packet operation, split-screen operation, on-screen status, file transfers, macros, QSO logging, menu-driven help, on-screen parameter lists, and separate windows for each data controller.

For more information, contact: Advanced Electronic Applications, Inc., P.O. Box C2160, Lynnwood, WA 98036 (206-774-5554; FAX 206-775-2340); or circle number 101 on the reader service card.

MFJ-8400K 2 Meter Repeater Monitor Receiver Kit

MFJ Enterprises, Inc. has announced their new MFJ-8400K Repeater Monitor Receiver Kit. The MFJ-8400K tunable receiver kit offers a low-noise, high-gain RF preamp that provides 0.1 microvolt sensitivity, 6:1 reduction drive, a dual conversion superhet receiver with ceramic filters, and a crystal-controlled second oscillator. The MFJ-8400K comes with MFJ's exclusive "TailFree" squelch, a shaped audio response, a 19 inch 1/4 wave whip antenna, and a 50 ohm antenna input. The unit also has tune, squelch, and volume controls, built-in speaker, glass epoxy PC board, and an all-metal cabinet. It also comes with a step-by-step instruction booklet. For more information or to order, contact any MFJ dealer or MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762, or call 601-323-5869; FAX 601-323-6551; order toll-free 1-800-647-1800; or circle 104 on the reader service card.



G.G.T.E. Morse Tutor Gold

G.G.T.E., the developer of Morse Tutor and Morse Tutor Advanced Edition, has announced the release of Morse Tutor Gold. This new product adds enhanced drill capabilities, sound card support (certified by Creative Labs, the producer of Sound Blaster), type-along capabilities, and improved correction techniques to the Morse Tutor Advanced Edition program. The program also features an installation utility which speeds up the installation process. Morse Tutor Gold offers customized random drills, code speeds of 1 to over 100 words per minute and adjustable in tenths of a word per minute, support for standard and Farnsworth methods, flash-card-like introduction of new characters, fully adjustable tone frequency, random character and word reviews, and compatibility with all DOS computers. For more information contact G.G.T.E., P.O. Box 3405, Newport Beach, CA 92659 (phone/FAX 714-968-1571); or circle number 102 on the reader service card.

Xantek Super DX Edge, Ver. 2

Xantek has announced the availability of the Super DX Edge, Version 2. The Super DX Edge is the computerized version of the DX Edge, the DX operating aid.

The Super DX Edge is available for computers that run DOS. The new Version 2 retains the features of the Super DX Edge and adds several new features including Gray Line curves for any day of the year, automatic antenna directions, automatic MUF calculations, Gray Line reports for any place and time, instant access country file that can be updated to add any location to the file, and Super DX Edge can be customized for your location. For more information, write to The DX Edge, P.O. Box 834, Madison Square Station, New York, NY 10159, or circle number 106 on the reader service card.

Optoelectronics The Scout Model 25

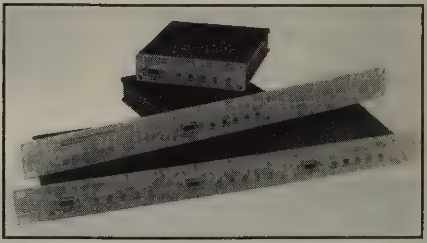
Optoelectronics, Inc. is now offering a new product for the security, surveillance, law enforcement and hobby monitoring markets. The Scout is a hand-held device intended to detect radio transmitters in the near field.

For walk-by applications, the Scout can automatically detect and record 200 unique frequencies and up to 250 repeat hits on any that were previously recorded. After recording, the Scout data can be down loaded into a computer using software supplied and an optional TTL to RS-232C interface converter. Third-party software is being developed to check Scout frequency data against the FCC data base on CD ROM. To monitor those frequencies recorded, a CI-V capable communications receiver can be connected to the Scout and tuned to each recorded frequency in Recall Mode.

In Drive-By mode the built-in beeper signals when the Scout records a new frequency with a double beep. A single beep indicates a hit on a previously recorded frequency. Reaction tuning a receiver in drive-by operation provides instant hands-free monitoring of the detected transmissions. A high-capacity (850 ma hour) nickel-cadmium battery pack is used to provide 6+ hours of operation. 12 VDC operation in a vehicle is possible using the appropriate adapter. The Scout aluminum cabinet measures 3.7"H × 2.75"W × 1.2"D. The Scout comes with an AC adapter charger, 3.5 inch disk with PC compatible utilities, and an operators manual. For more information, call 305-771-2050 or FAX 305-771-2052, or circle number 105 on the reader service card.

Communications Specialists' Shared Repeater Tone Panel

Communications Specialists, Inc. has announced the availability of their new Shared Repeater Tone Panel, model TP-3200. The unit is the complete tone and control interface between the repeater receiver and transmitter. It supports 157 repeater subscribers in CTCSS and DCS signaling formats. The menu-driven RS-232 programming is accomplished locally by computer or remotely with a modem over landline. DTMF programming on the repeater channel is also included. The TP-3200 is available in desktop or rack-mount versions. A catalog is available upon request. For the catalog and/or information, contact Communications Specialists, Inc., 426 West Taft Avenue, Orange, CA 92665-4296 (USA/Canada phone 800-854-0547; fax 800-850-0547; International phone 714-998-3021; FAX 714-974-3420); or circle 103 on the reader service card.



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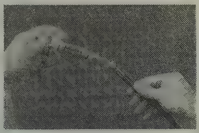

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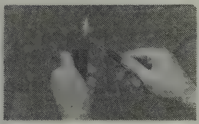

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BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

A Look Back and The Conclusion of "Goodies"

Over the years *CQ* has served new amateurs very well. The "Novice shack" column initially was written by Carl Drumm, W2GJV, for the September 1951 issue of *CQ*. Herb Brier, W9EGQ, wrote this column from January 1952 through July 1955. Walt Burdine, W8ZCV, wrote the August 1955 column.

The column's name was changed from the "Novice Shack" to "Novice" starting with the September 1955 issue of *CQ*. Walt Burdine wrote the September 1955 through February 1957 columns. Don Stoner, W6TNS, wrote the March 1957 through January 1962 columns. Walt Burdine then resumed the task, and he wrote this column from February 1962 through May 1966. The "Novice" column was not printed from June 1966 through October 1973, but those issues included many excellent articles for beginners. My friend Herb Brier wrote the November 1973 through September 1977 columns. I wrote the October 1977 through March 1988 "Novice" columns.

The name of the column was then changed from "Novice" to "Bill's Basics," and I have written each one since April 1988.

In summary, I have written 207 of these columns, Herb Brier wrote 90 of them, Walt Burdine wrote 71, Don Stoner wrote 59, and Carl Drumm wrote one column. It is hoped that we all have provided beneficial information to the readers of *CQ* over the years.

Shopping Ideas For After The Holidays, Too

Here is the concluding portion of the article on amateur radio goodies we began last month. If this issue of *CQ* arrives in time, it may give you some hints for last-minute holiday gifts. If it arrives after the holidays, hopefully you will have received a few dollars as gifts, and you can shop for an extra goody or two.

The first part of this article covered badges, beam headings, belt buckles, calendars, clocks/watches, clothes, cups/mugs, decals, HT items, key covers, key rings/chains, license plate items, lights, luggage tags, maps, medals, money clips, patches, pens, and pins.

Plaques/Trophies. Blacksmith Brownie is Jeffry Brown, WX2Z. He sells a very nice 3.5 by 5 inch plaque which features a genuine hot-forged pony shoe that is polished before it is hand-stamped (with the purchaser's callsign) on an anvil. The pony shoe is detailed in gold prior to being mounted with authentic horseshoe nails on a 0.75 inch thick piece of finished red oak wood. The corners and edges of the plaque are milled out using a stone grinding wheel, leaving interesting friction burns on the milled out indents. The plaque is then finished with a natural oak stain. Last of all, two coats of a clear high-gloss polyurethane sealant are applied to protect and enhance the beauty of the wood. A routered notch on the back side makes it easy to wall mount the plaque. If preferred, this plaque can be ordered with a desktop mounting bracket. The price of a basic plaque is $14, including s&h fees. A gold ARRL logo pin can be added (between two horseshoe nails) at the additional cost of $4. It is interesting to note that Jeffry has been a real blacksmith for more than two decades. Each buyer must clearly list the callsign to be stamped on the pony shoe. A plaque with class of license burned into the wood can be ordered. The date the license was initially issued can also be burned into the wood. Brass Pounder, Good Luck, Member ARRL, Rag Chewer, #1 DX'er, #1 Fist, #1 Ham, or 10-10 # can also be burned into the plaque. His address is P.O. Box 382, Hamburg, NJ 07419 (201-827-5414).

Novice Roundup

The 1995 ARRL Novice Roundup is a nine-day low-pressure contest for Novices and Technicians. Participation can be for just a few minutes or for a maximum of 30 hours. The 1995 contest begins at 0001 UTC on January 28 and ends at 2359 UTC on February 5.

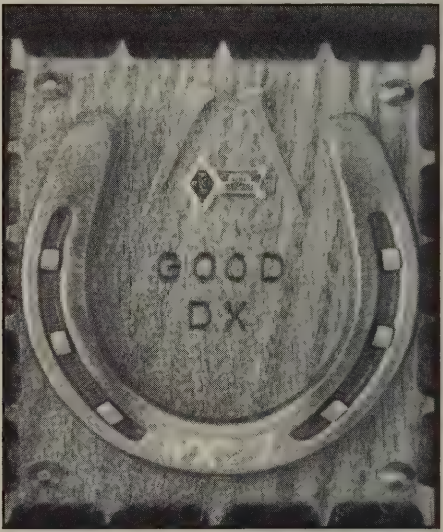
This may be the last Novice Roundup as we have known it. Billy Lunt, KR1R, the contest manager, has advised us that major changes to the contest are being considered to increase participation. So if you want to still enjoy the contest as it has been previously, we advise you to participate in '95.

For further details on the contest and for log forms, contact The American Radio Relay League (ARRL), 225 Main Street, Newington, CT 06905 (203-666-1541).

Trophies by Edco is run by Rick Cordary, KN4CV. This is an excellent source of advertising specialties, badges, plaques, and trophies. Their address is 3702 Davie Boulevard, Ft. Lauderdale, FL 33312-3494 (305-587-0137; FAX 305-581-7680).

Publications. A few of our best suppliers of amateur radio publications are listed herein for your use. Their data can be requested directly. CQ Communications, 76 North Broadway, Hicksville, NY 11801. The American Radio Relay League, 225 Main Street, Newington, CT 06111. Grove Enterprises, P.O. Box 98, Brasstown, NC 28902-0098. Radio Bookstore, P.O. Box 209, Rindge, NH 03461-0209. TAB, Blue Ridge Summit, PA 17294-0850. Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Worldradio Books, P.O. Box 189490, Sacramento, CA 95818.

AntennasWest offers their *1994 Radio Adventure* publication for $1.00. This 64-page booklet covers wire antennas in detail, using easily understood explanations. HT 2-meter Pico-J, tiger tail, walking stick, and whip antennas are included in this manual. Dipole coverage includes BumbleBee, folded, Kansas, quietflex, quietflex fan, and today's no tune (TNT) antennas. Loop antenna coverage includes compact distributed capacity (DC), G4EZG, multiband, notch, omni, random, sandwich, Swiss, and UniLoop antennas. Corner beam, gap, G5RV, half-square, slinky, and windom antennas are also detailed in this booklet. Directivity, gain, height, HFDX, and radiation angle factors are explained in simple language. Baluns, masts, QSL cards, solar power, support line, and wire antenna erection gear are also covered in this manual. The address is AntennasWest, Box 50062, Provo, UT 84605-0062.



Blacksmith Brownie's 3.5 x 5 inch plaque features a horse shoe hand-stamped with one's callsign. (See text for more information.)

The *Antique Radio Classified* is a monthly magazine with more than 8000 subscribers. It includes articles, classified advertisements, book data, early radio ('40s and '50s data), and a lot more information. A 6-month trial subscription costs $16.95, whereas $31.95 pays a full year's subscription. Subscribers are entitled to a 20-word advertisement at no extra charge. A free copy of this publication can be requested. Their address is P.O. Box 2, Carlisle, MA 01741 (508-371-0512; FAX 508-371-7129).

Buckmaster Publishing offers every issue of *CQ* from January 1945 through 1993 on microfiche for $360; every issue of *73* on microfiche from October 1960 through the end of 1993 for $290; and *QST* from December 1915 through the end of 1993 for $498. Prices include domestic s&h. Annual updates cost $10. They also sell their Ham Call CD-ROM at $55, including s&h charges; it provides quick references to domestic and foreign callsign data, with almost one million listings. Their address is Route 4, Box 1630, Mineral, VA 23117 (tele-

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45527 Third Street East, Lancaster, CA 93535-1802 phone 703-894-5777 and 800-282-5628).

The *CQ 1995 Amateur Radio Almanac* is an approximately 500-page book filled with useful information. In regard to amateur radio, it covers antennas, awards, clubs/societies, code, contests, conventions/hamfests, equipment/accessories, FCC rules and regulations, geographic statistics, history, postal regulations, propagation, and much more. The almanac is priced at $19.95, plus the shipping fee. It can be ordered from CQ Communications, Inc., 76 North Broadway, Hicksville, NY 11801 (800-853-9797 orders only).

Jim Creevay, W4UYZ, offers the *Amateur Radio DX Blue Book* for $9.45 each, including s&h charges. Each current amateur callsign prefix is listed with its associated capital, country, CQ/ITU zones, DXCC status, UTC/local time differences, map grids, reciprocal operating and third-party traffic allowances, plus the number of amateurs. An alphabetical listing of countries and islands is included, plus eight fold-out 11 by 17 inch prefix designated maps of all countries and about 300 Pacific islands. An English/Russian QSO phrases list is also featured in Jim's book. Many other useful items of information are included. If you want complete details, write to Amateur Radio DX Blue Book, 4920 Mayflower Street, Cocoa, FL 32927 (407-632-6809).

Electric Radio is published monthly by Barry Wiseman, N6CSW. If you are interested in the histories of manufacturers and antique radio equipment, this publication should appeal to you. The domestic yearly subscription rates are $28 and $38 for second- and first-class mailing, respectively. Their address is P.O. Box 57, Hesperus, CO 81326 (phone/FAX 303-247-4935).

KDC Sound markets their 200-page *Ultimate Modification Bible* at a cover price of $29.95. It shows microphone connections to more than 800 rigs, 125 equipment modifications, 50 crystal charts, 15 scanner modifications, and much more. Their address is 5 Pine Meadow, Conroe, TX 77302.

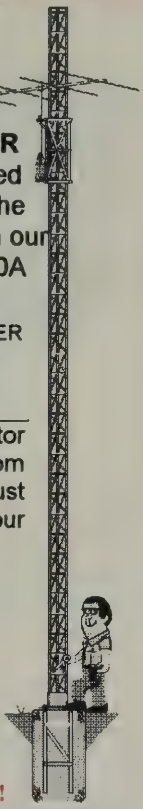
The *Radio Amateur Callbook* is sold in two versions. The North American and International volumes are priced at $29.95 each. Your local radio store probably has these books. The Callbook's address is P.O. Box 2013, Lakewood, NJ 08701 (1-908-905-2961; FAX 1-908-363-0338).

Resource Solutions offers their *Radio Mail Order Catalog and Resource Directory* at $19, which includes s&h charges. It provides 1700 listings in 220 categories. Their address is 6050 Peachtree Parkway, Suite 340-228, Norcross, GA 30092.

The *Amateur Radio Language Guide* provides hundreds of phrases useful to amateurs. The guide is printed in five volumes which sell at $10 each. The languages included are Arabic, Chinese, Croatian, Czechoslovakian, Danish, Dutch, English, Finnish, French, German, Hawaiian, Hungarian, Indonesian, Italian, Japanese, Korean, Norwegian, Filipino, Polish, Portuguese, Romanian, Russian, Serbo-Croatian, Spanish, Swedish, Turkish, and Vietnamese. Their address is ROSE, P.O. Box 796, Mundelein, IL 60060-0796. These volumes give us a chance to expand our contacts with DX amateurs.

(Also see FBenterprises and Paul Washa.)

QSL Items. Vaso Nagl, KD4WVK, offers 1000 mini QSL cards at $12.50. Vaso uses a paper stock and an ink color of his own choos-



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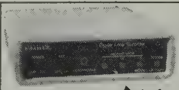

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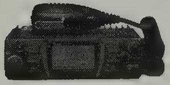

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1995 CALLBOOKS

THE QSL BOOK!

Continuing over a 70 year tradition, we bring you two new *Callbooks* for 1995 with more features than ever before.

The 1995 North American Callbook lists the calls, names, and addresses for more than 600,000 licensed amateurs in all countries of North America, from Panama through Canada, including Greenland, Bermuda, and the Caribbean Islands, plus Hawaii and the U.S. possessions. Over 1,800 pages. Item # 087166 (paper) $35.00

The 1995 International Callbook lists more than 650,000 licensed amateurs in countries outside North America. Its coverage includes South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions). Over 1,900 pages. Item # 087204 (paper) $35.00

Every active amateur needs the Callbook*! Fully updated and loaded with extra features, the 1995* Callbooks *will be published in December 1994. Order now from your dealer or send in the coupon below.*

Please send me _______ copy(ies) of ***The 1995 North American Callbook*** (Item # 087166, $35.00) and _______ copy(ies) of ***The 1995 International Callbook*** (Item # 087204, $35.00).

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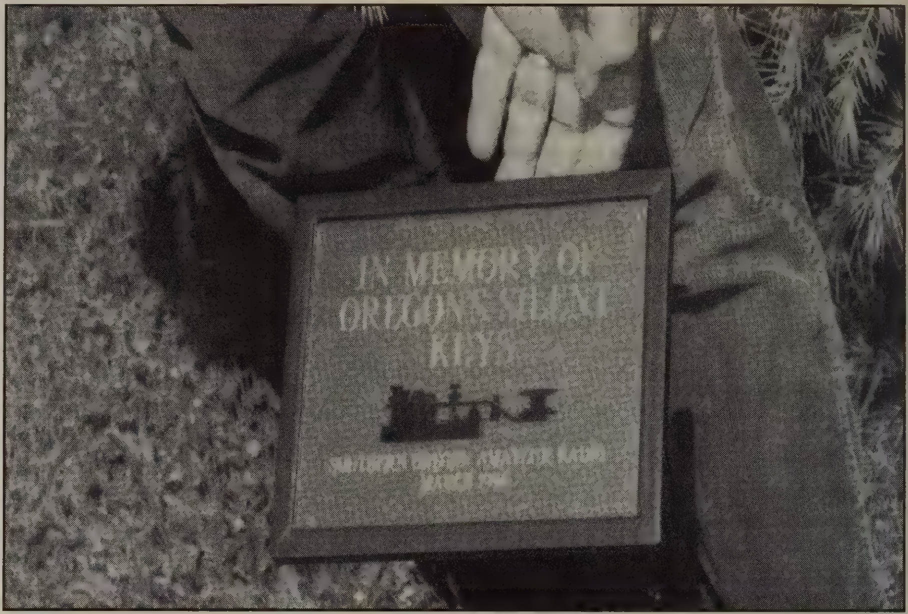

Fred Schotte, N7XNH, provided this picture of the plaque attached to a tree to memorialize all Oregon Silent Keys. This memorial was originally created for Derald Lehman, KD7MN, but was later expanded in scope.

ing. Shipping charges are included in the stated prices. He also sells business-size #10 envelopes ($36 per 1000) and window #10 envelopes ($39 per 1000). Details can be requested from Artist, P.O. Box 23325, Nashville, TN 37202 (615-731-4895).

WX9X, offers 1000 QSLs from $28.95. Write or call for free samples (stamps appreciated), WX9X, 354 West Street, Valparaiso, IN 46383 (219-465-7128; FAX 219-464-7333).

QSLs by W4MPY offers 1000 QSLs from $24.95. For more information and/or free samples write to 682 Mt. Pleasant Rd., Monetta, SC 29105 (phone/FAX 803-685-7117).

Azimuth Communications Corporation sells the Awards QSL Library. These are customized three-ring albums which can be used to store QSL cards, award by award. DXCC, WAS/WAC, and WAZ binders are available, plus a general file QSL binder. These binders are 19 inches high, 13 inches wide, and 2 inches deep. Each one can hold up to 240 cards. They are priced at $22.90 each, including s&h fees. Packs of 20 extra album pages are sold at $15.90, including s&h charges. Azimuth also markets the Grand 24 digital 24 hour clock, which features giant-size digits. It has a brushed black metal frame and it is priced at $32.90, including s&h fees. The GC12 is the same type of clock except that it shows 12 hour AM/PM time. Both models sell for the same price. Their address is 3612 Alta Vista Avenue, Santa Rosa, CA 95409-4049 (707-577-8007; FAX 707-573-1482).

Joe Saunders, K3UAL, has clear plastic QSL card holders which enable an amateur to display received cards without having to damage them with tape or thumb tacks. I have used this type of QSL display many years. It has the added flexibility of allowing one to quickly and easily change the cards displayed. These plastic display holders sell at $5 for a package of three. Each holder can be used to display up to 20 QSL cards. Joe is also a QSL card printer. His address is Club Printers, 1520 Jutewood Avenue, Hyattsville, MD 20785 (phone 301-773-9383 and 301-773-5074). If you want samples of his cards, send 50¢ (stamps or cash) with your request.

Creative Imprinting Company sells 100 calling cards at $13.95. They show address, callsign, name, and (if desired) telephone number. The address is 6522 Chesterfield Avenue, McLean, VA 22101.

K-K Labels sells material one can use to convert standard postcards into QSL cards. This is an essential capability for new amateurs who have not had a substantial supply of cards printed while holding a callsign which she/he intends to change at the next upgrade. Their address is P.O. Box 412, Troy, NY 12181-0412.

MFJ sells 500 eyeball QSL cards at $39.95, plus s&h charges. These 2.0 by 3.5 inch "business" cards are particularly useful at conventions, radio club meetings, and other amateur radio events. The MFJ world map clock measures 2.5 (H) by 4.125 (W) by 2.25 (D) inches. The price is $24.95 plus s&h. The MFJ-112 shows the time and date at each worldwide location, and it allows one to see where each contact (amateur) is located. The MFJ-112 also shows the month, date, and year, plus the day of the week. Push-button switches enable one to easily move the display to any location in any time zone. It has a black map on a gold background. An additional feature of the MFJ-112 is that it includes an alarm. A coffee mug is available at $3.95, plus s&h. The MFJ and Ameritron logos are shown in red and blue ink, with one on each side of the cup. The address is MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (800-647-1800).

Spangler X-pressions offers 1000 full-color 3.5 by 2.0 inch eyeball QSL cards at $79. The address is P.O. Box 6262, Kansas City, KS 66106 (1-800-466-1616).

7-Mike Hamstuff sells QSL storage boxes and index dividers. The sets of dividers are for all 50 states, all DXCC countries, 1 through 0, A through Z, 10 through 160 meters (including

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Dynamic ALC™ doubles average SSB power

The AL-80B's exclusive *Dynamic ALC™* gives you high-level low-distortion RF processing. When activated, it can more than double your *average* SSB power and produce up to 6 dB improvement in intelligibilty. It maximizes your talk power without distortion and splatter.

A convenient front panel control lets you adjust your output power level.

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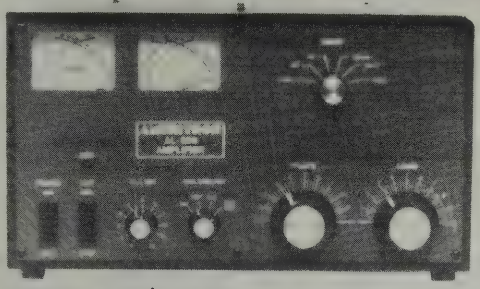
The AL-80B's exclusive *Instantaneous RF Bias™* completely turns off the Eimac 3-500Z tube (except filaments) between words and dots and dashes. It eliminates hundreds of watts wasted as heat to give you cooler operation and longer component life.

Gutsy Heavy-Duty Power Supply

The guts of the AL-80B is its heavy *heavy* duty power supply. A 26 pound transformer using a high silicone steel core, computer grade capacitors, heavy duty bleeders and ten 3 amp, 1000 V power rectifiers give you a stiff 2700 volts fully loaded. Many amplifiers using *two* 3-500Zs use such small power supplies they don't deliver much more power output than the AL-80B.



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Ameritron's new AL-811 linear amplifier gives you plenty of power to bust thru QRM. You get a quiet desk top linear that's so compact it'll slide right into your operating position -- you'll hardly know it's there . . . until QRM sets in. And you can conveniently plug it into your nearest 120 VAC outlet.

You get three tough vertically mounted 811A transmitting tubes, extra heavy duty power supply, all HF band coverage, pressurized ventilation, tuned input, dual illuminated meters, adjustable ALC, standby switch, transmit LED, UPS shippable and much more.

Select the 3 tube 600 watt out AL-811, $649 -- or the new 4 tube 800 watt out AL-811H, $795.

70% efficiency

The AL-80B is built on a rugged steel chassis. It has a separate RF compartment that's fully shielded to keep RF from leaking out. This keeps RFI and TVI to a minimum.

Superb RF design and layout, Hi-Q tank circuit and commercially rated RF power components give you nearly 70% plate efficiency over the entire operating range. Your power goes into your antenna instead of heating up your amplifier.

A whisper quiet internal fan draws in cool air over power supply components and pressurizes the 3-500Z tube compartment to remove heat for longest life.

Tuned Input lets your rig deliver full output

A 50 ohm broadband Pi-Network *tuned input* is used.

Pi/Pi-L Output Network

A carefully designed Pi/Pi-L output network using the optimum Q for each band gives you exceptionally smooth tuning, extremely wide matching range, full band coverage and peak performance at all power levels.

Has ball bearing vernier reduction drives with logging scales on plate and load controls.

Step-Start Inrush Protection™

Step-Start Inrush Protection™ stops damaging inrush current with a start up sequence that's *easy* on your tube and power supply components.

Multi-Voltage Power Transformer

Ameritron's exclusive *Multi-Voltage Power Transformer* lets you optimize for different line voltage. You can select from 14 different *primary* voltages from 90 to 140 VAC and 205 to 250 VAC.

Dual Illuminated Cross-Needle Meters

Ameritron's dual illuminated cross-needle meters give you *four separate meters* to monitor your operating conditions -- you can tell right away if something is wrong.

QSK Compatible

The fast *custom* T/R (transmit/receive) relay in the AL-80B switches nearly as fast as some vacuum relay QSK T/R switches.

For *lightning fast* QSK operation use the optional external Ameritron *electronic PIN diode* QSK-5 T/R switch or the internal QSK-5PC. Please contact Ameritron for details.

Plus more . . .

An *Standby* switch lets you run barefoot, but you can instantly switch to full power if you need it.

Has transmit LED; 12 VDC, 200 mA jack; 12 VDC keying relay for solid state and tube rigs; tough, nearly indestructible Lexan-over-aluminum front panel. Two year limited warranty.

AMERITRON offers the best selection of legal limit linears!

These 3 rugged linears all use a super heavy duty hypersil® power supply capable of 2500 watts!

Ameritron's most powerful amplifier

AL-1500
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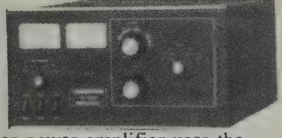
Suggested Retail



Ameritron super power amplifier uses the herculean Eimac® 8877 ceramic tube.

It's so powerful that 65 watts drive gives you full legal output—and it's just loafing because the power supply is capable of 2500 watts PEP.

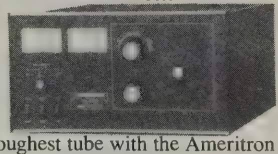
Ameritron's Dual 3-500Z linear

AL-82
$2095.00
Suggested Retail

This linear gives you full legal output using a pair of Eimac® 3-500Zs. Some competing linears using dual 3-500Zs don't give you 1500 watts because their lightweight power supplies can't use the tubes to their full potential.

Ameritron's 3CX1200A7 linear

AL-1200
$2195.00
Suggested Retail



Get ham radio's toughest tube with the Ameritron AL-1200—the Eimac 3CX1200A7. It has a 50 watt control grid dissipation—12 times tougher than the 4 watt rating of the 3CX800A7—yet you get the same full legal output as you get from a *pair* of 3CX800A7s.

AMERITRON brings you the finest high power accessories!

Legal limit antenna tuner

ATR-15
$399
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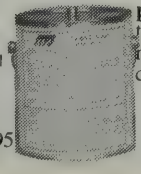
Ameritron — *the high power specialist* — brings you the ATR-15 antenna tuner that's designed for legal limit amplifiers. Heavy duty silver plated bandswitch virtually eliminates switch failure. High power transmitting capacitors. 1.8-30 MHz. Peak reading SWR/wattmeter. 6 position antenna switch. Selectable 1:1 or 4:1 balun. 5¼ x 13¼ x 13½ inches. Meter lamps uses 12 VDC.

Legal Limit Dummy Load

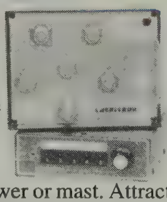
ADL-1500X
$39.50
Suggested Retail



Oil cooled 50 ohm dummy load. Handle 1500 W for 5 min. SWR under 1.2 up to 30 MHz. Low SWR to 400 MHz. 7½" H x 6 5/8" D. **ADL-1500X** without oil, $39.95. **ADL-1500** with oil, $59.95

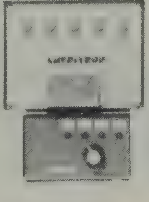
Remote Coax Switches

RCS-8V
$149
Suggested Retail



RCS-8V, DC-UHF 5 KW Coax Switch. Replace 5 coax feedlines with one with this Remote Coax switch. Weatherproof box mounts outdoors on your tower or mast. Attractive control unit sits on your operating desk. Low SWR to 250 MHz. Usable to 450 MHz. Low loss. Rated at 5 KW to 30 MHz, 1 KW at 150 MHz. **RCS-8VN, $159.00** with "N" connectors.

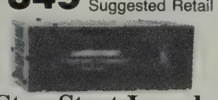
RCS-4, $134.00, 4 position HF switch. Similar to RCS-8V. No control cable needed. Handles 1500 watts continuous.



RCS-4
$134.50
Suggested Retail

QSK-5 Pin Diode T/R Switch

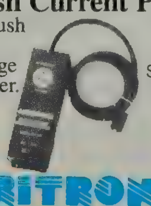
$349 QSK-5 Suggested Retail



Self-contained, connects externally to most HF amplifiers. Handles 2.5 KW PEP, 2 KW CW. Six time faster then vacuum relay. 6x4x9½ inches.

Step-Start Inrush Current Protector

ICP120/240
$79
Suggested Retail



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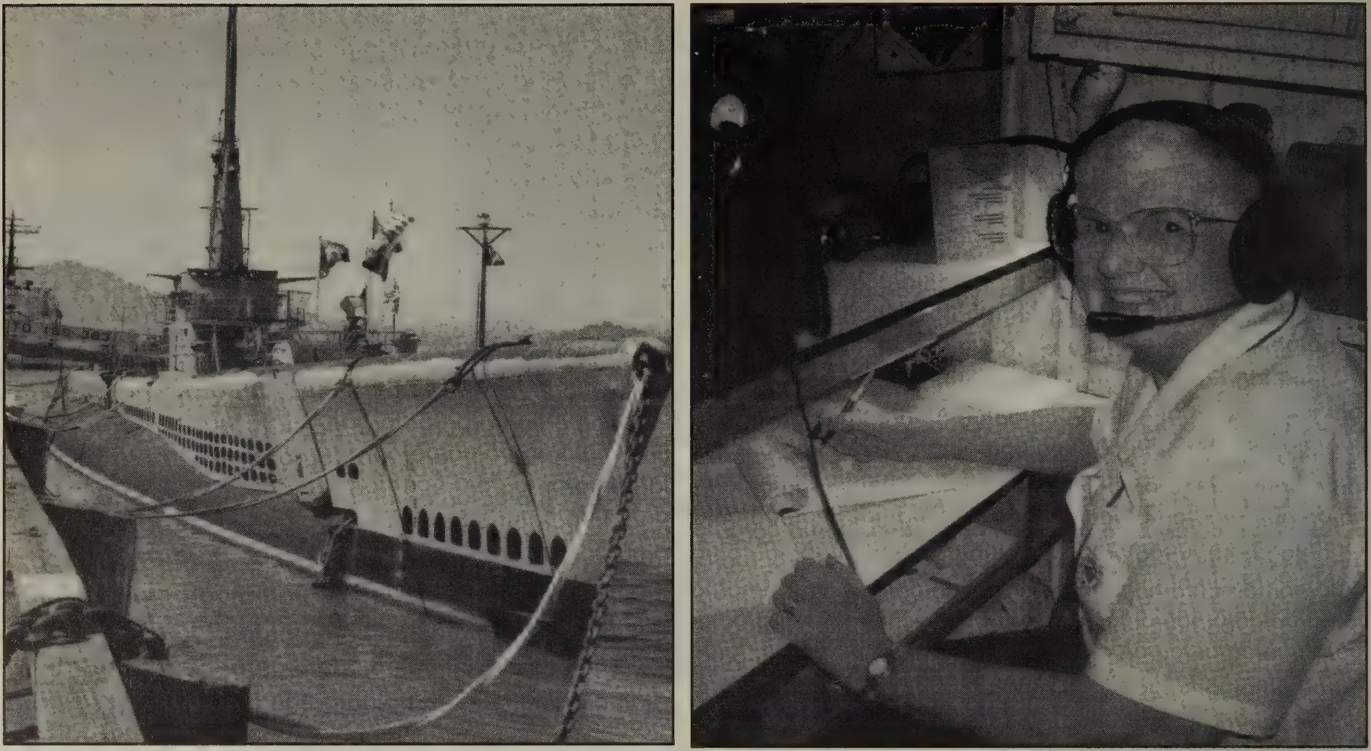

Eleanor Fajardo, KA6VEU, operated a special event station from the radio room of the USS Pampanito. *This WW II submarine is permanently moored at Pier 45 of Fisherman's Wharf in San Francisco. Marilyn Bagshaw, N6VAW; Bob Fajardo, WA6VOI; Eleanor Fajardo, KA6VEU; Jim Pelmutter, N6PTM; Reid Ross, W7HOP; and Joe Senft, KM6TN, commemorated the 50th anniversary of the D-day landings using this submarine's original callsign (NJVT) as the suffix added to their own callsigns. The permament amateur radio station aboard the* Pampanito *(SS383) provides HF, VHF, and UHF communication capabilities. This submarine is open daily to the public and amateurs are usually aboard Thursdays to show the usually off-limit radio room to visiting amateurs. W6DDB has contacted the* Pampanito *in the 40 meter Novice band.*

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No time to "study" CW? **CW Lite** is the answer. Learn code quickly, easily, effortlessly as you take a "mental vacation" once each day. **Sit back, relax, and LEARN CODE** while you recharge your batteries in just a few minutes. This tape uses hypnosis conditioning and subliminals to rapidly teach you the code. Much faster and easier than *mere copy practice tapes.* You'll be copying code with the best of them in no time at all. For those who have NOT tried and failed with the old fashioned systems. **CW Lite** $15.95 ppd (+3/two-day delivery) in US

Within 60 days after starting with CW Lite, I was able to copy 15 WPM in my head. I took my CW test and passed on the first try—N3KRE

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the WARC bands), and a set of do-it-yourself dividers. Lee Finkel, KY7M, also sells a wood cover for the Bencher paddle, plus miscellaneous accessories and parts. His address is 7-Mike Hamstuff, P.O. Box 14455, Scottsdale, AZ 85267-4455.

(Also see AntennasWest and W5YI Group.)

Rubber Stamps. M. Bohner offers custom self-inking rubber stamps at $36.75, including s&h. These stamps use red rubber, not photopolymer. One's picture appears beside name, callsign, and address. A flier and samples are available to people who request them and send $1.00 to cover costs. Four to six weeks are required to produce and ship each stamp. The address is P.O. Box 6373, Libertyville, IL 60048-6373.

Louis Craycraft, K8NUJ, sells custom self-inking stamps in four sizes and a choice of black, blue, or red ink. Kwik Stamp I is 1.75 by 0.625 inches, with up to 3 lines. Kwik stamp II is 2.25 by 1.0 inches, with up to 4 lines. Kwik Stamp III is 2.5 by 1.125 inches, with up to 6 lines. The prices for these stamps are $10.95, $13.95, and $15.95, respectively, including s&h. Kwik Stamp IV is 3.0 by 1.5 inches. Kwik Stamp IV prices depend on the complexity of received orders. Type style is selectable. Allow two working days for order to be shipped. The address is 1502 53rd Avenue West, Bradenton, FL 34207-2865 (FAX 813-758-9758).

Doug Reid, WB8MKV, sells a variety of rubber stamps for use by amateur radio operators. These stamps can be used to imprint envelopes, QSL cards, stationery, and anything else. His style M-4 stamp shows an elephant and "Don't Forget To QSL." Style M-8 has "Amateur Radio" (plus your callsign) enclosed in a circle. Style M-10 appropriately shows "Ten-Ten" (plus your number). Style M-20 has the outline of a telegraph key. The M-4, M-10, and M-20 stamps cost $4.95 each. The M-8 stamp is priced at $10.95, which includes s&h. The address to use is Reid Associates, 6680 Mellow Wood Lane, West Bloomfield, MI 48322-3765 (810-851-0260).

SCRS makes self-inking rubber stamps which sell at $14.95 each. Their address is Box 4550, Pasadena, TX 77502.

Safety Items. The ONV Safety Belt Company sells a combination safety belt and seat harness at $93.95, which includes s&h. A seat belt without the seat harness is $78.95. Their address is P.O. Box 404, Ramsey, NJ 07446 (800-345-5634; FAX 201-327-2462).

Signs. CAM Lazercut Signs offers callsigns which are laser cut in maple laminate wood with a light front and dark relief. One inch and two inch characters are mounted on a one-half inch base, and they cost $2.00 and $4.00 per character, respectively. Three inch characters are mounted on a one inch base, and they cost six dollars per character. Shipping charges are included in the stated prices. Their address is P.O. Box 1090, Enfield, CT 06083-1090 (203-741-8465).

Sign On markets both magnetic and suction-mounted callsign displays for car-window or trunk attachment. These signs are easily transferable from one vehicle to another. The price is $9.95 apiece and two for $18.00, including s&h. The address is 1923 Edward Lane, Merrick, NY 11566 (516-546-4362). Joel Dulberg, KA2FHU, advises that your SASE and request for information will receive prompt action.

(Also see Leather & West, LQV Engraving, and W5YI Group.)

Software. AmSoft sells a CD-ROM amateur radio callsign May 1994 database at $43, including s&h. A three-issue annual subscription costs $99 plus s&h. Their address is P.O. Box 666, New Cumberland, PA 17070-0666 (717-938-8249; FAX 717-938-6767).

Engineering Systems is run by Paul Schmid, W4HET. He offers Skycom 1.1 worldwide hourly high-frequency predictions at $30. His more sophisticated Skycom 1.5 is also available at $30, or both can be purchased at $50. His DX Window shows gray-line data relative to one's station location; it is priced at $35 for floppy disk and a detailed instruction manual. The expanded Beam Headings List and Program sells at $6; it is supplied free with a Skycom 1.1 or 1.5 order. His Satellite Prediction program costs $50. The s&h fee is $5 domestic and $10 international. These predictions are unusual in that they take total path loss into consideration. The address is P.O. Box 939, Vienna, VA 22183 (1-703-687-3000; FAX 1-703-687-5861).

HamWindows markets a low-cost entry-level software program in three variations. The address is 2121 East Pacific Coast Highway, Suite 120-C, Corona Del Mar, CA 92625 (714-729-4222; FAX 714-644-6277).

Interflex Systems offers performance software that is easy to operate and powerful. It can be used to provide advanced text handling, automatic QTH/QSL exchange, background file transfers, conferencing, logging, macro files, quick reference guide, and robot CQ's. The price is $84.95, which includes a 95-page manual and shipping costs. The address is Box 6418, Laguna Niguel, CA 92607.

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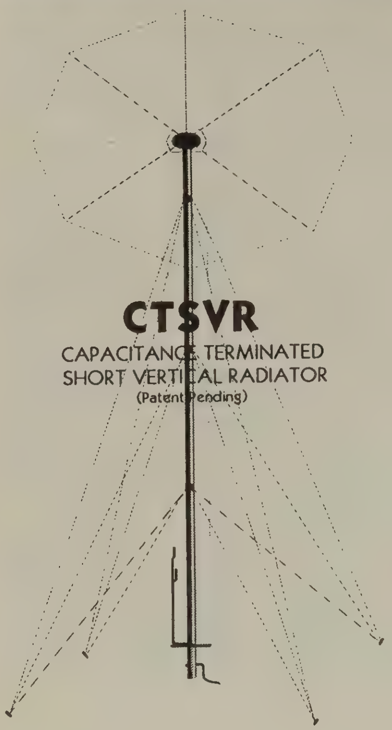

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SWR: 1.5:1
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Ground Rod: .... 4′ Minimum
Number of Radials: 6
Radial Length: .... 34′
Height: .... 31′ 1"
Mast: .... Telescoping
Top Hat: .... 17′ Dia. Aluminum and
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If you like contesting, you should investigate the software being offered by K1EA Software, 5 Mount Royal Avenue, Marlborough, MA 01752 (508-779-5054; FAX 508-460-6211).

R & B Software markets an extensive variety of quality shareware for use with IBM compatible computers. For details contact Brian Massa, KB7LXH. Their address is P.O. Box 1428, Idaho Falls, ID 83403 (208-529-4408).

Bob Dalleske, W6AMW, is marketing his Super VR85 software program at $25. If you are interested in tracking satellites, his program could be of interest to you. The address is RLD Research, Box 888, 801 Oak Street, McCloud, CA 96057-0888. Bob has sold more than 3500 VR85's worldwide since 1985.

RT Systems markets an amateur radio database which enables one to quickly and easily locate amateurs by names or callsigns. One can search for a specified city, state, or ZIP code. This database is available in CD-ROM or disk form at $44.95 each, including s&h. Search filters allow searches by address, age, callsign area, callsign prefix, callsign suffix, first name, and license class. Options ($7.50 each) provide county cross reference, date first licensed, date of birth, license expiration date, and previous callsign data. The address is 8207 Stephanie Drive, Huntsville, AL 35802 (phone 1-800-723-6922 and 1-205-882-9292).

Alan Yorinks, WB2OPA, offers his LogMaster Plus/Plus all-band all-mode logging system designed for use with PC compatibles. It supports ICOM, Kenwood, Ten-Tec, and Yaesu transceivers. The price of a complete system is $89.95. A demonstration disk is available at $5, which can be applied towards a later purchase of the complete system. Their address is Sensible Solutions, P.O. Box 474, Middletown, NJ 07748 (800-538-0001).

Sheldon Shallon is W6EL. W6EL Software offers the Miniprop Plus propagation prediction program for IBM and IBM compatible computers. Miniprop Plus predicts signal levels for every half hour of the day on any path, and on any frequency, between 3 and 30 MHz. World maps show the great circle path and day/night regions for any date and time, plus the best frequency to use to contact each of the 57 areas of the world. Also, MUFs, beam headings, sunrise/sunset times, and more are included. All screens are in full color on suitably equipped computers. A printed manual contains detailed instructions. Miniprop Plus is priced at $60. W6EL Software's address is 11058 Queensland Street, Los Angeles, CA 90034-3029.

Dave Farnsworth, WJ2O, offers a versatile software logging program. It features color and monochrome monitor compatibility, DXCC country identification (including CQ and ITU zones), 50-page instruction manual, 14 choices of QSO printouts, QSOs logged in a single main database, customized or standard printing of QSL cards and labels, QSL tracking, simple step-by-step menus, hand net operation format, adjustable DXCC prefix file (to accommodate changes), single keystroke pop-up utilities (such as DXCC list, international prefixes, Q-signals, state abbreviations, etc.), plus import and export files. The domestic (U.S.A. and Canada) and foreign prices for the logging program, including the manual, are $49.95 and $59.95, respectively. Their domestic address is WJ2O Master QSO Logging Program, P.O. Box 16, McConnellsville, NY 13401 (315-245-1010; FAX 315-245-1336). The address to be used in Europe is JONIT, Box 2063, S-831 02 Östersund, Sweden.

Video Tapes. CQ Communications offers seven video tapes. The video tapes sell for $19.95 each, plus s&h charges. The Ham Radio Horizons video provides a good introduction to amateur radio. CQ's "Getting Started" videos cover contesting, DXing, amateur radio, packet radio, satellites, and VHF. Their address is 76 North Broadway, Hicksville, NY 11801-9962 (toll-free orders 1-800-853-9797; FAX 516-681-2926).

Vibroplex. The Vibroplex Company, Inc. offers several items which may be of interest to code enthusiasts. Each item features the famous Vibroplex logo (bug) in some way. Their baseball-type light-blue hat ($6.95) is fully adjustable. It has the Vibroplex emblem in black, red, and gold. The key chain ($6.95) is cast solid brass, and it features the bug logo. Their black-glaze English ironstone mug ($8.95) shows their bug logo in 22-karat gold. An 8 by 18 inch black felt pennant ($3.95) shows the Vibroplex name and logo in gold. Their light-blue T-shirt ($11.95) is half cotton and half polyester. It is available in small, medium, large, and extra-large sizes. It features the bug logo. A $5 shipping charge applies to orders being shipped to U.S.A. addresses. The Vibroplex address is 98 Elm Street, Portland, ME 04101 (toll-free 1-800-262-8387, which is also 1-800-AMATEUR; FAX 207-775-7710). Vibroplex offers several other items of interest to amateurs. Vibroplex has been in business since 1890, which means their centennial occurred in 1990. The history of the Vibroplex Company is covered in detail in a 91-page book that is priced at $19.95; it includes copies of their advertisements, nameplates, and patents.

The W5YI Group. The W5YI Group sells two-color coffee cups with name and callsign on them at $12.95, including s&h charges. Their desk/wall nameplates cost $6 to $8.50, depending on size and lines of engraving. Their customized key/luggage tags sell at $5 (one side engraved) or $7 (both sides engraved), and they are available with a choice of strap or key ring. License-tag-size customized identification plates cost $14 (two lines engraved) and $15 (three lines engraved). Mini-QSL cards range in price from $17.95 to $33.95 per 250 and from $27.95 to $49.95 per 1000, depending upon card stock and printing selected. Custom name badges sell for $3.50 to $7.95, and they come with a choice of fastener (alligator clip, military clutch, over-pocket clip, or safety pin). Personalized identification plates cost $5 to $9, depending on size and number of engraved lines. Their address is P.O. Box 565101, Dallas, TX 75356 (toll-free orders 1-800-669-9594).

Conclusion

Three former suppliers of amateur radio goodies have definitely gone out of business during the past year, and 23 more of them did not answer my repeated requests for update data. It is hoped that many readers will become customers of our remaining suppliers. Any outfit which caters to amateurs is trying to appeal to a very small fraction of the American public.

73, Bill, W6DDB

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AWARDS

BY NORM VAN RAAY, WA3RTY

NEWS OF CERTIFICATE AND AWARD COLLECTING

County Hunting History

This history was originally written by Don Brickey, W7OK, for the 1972 Annual Convention at Peoria, Illinois. Since then it has been rewritten for various MARAC Conventions with additional info and changes from Bill, W0OWY; Arnie, K9DCJ; Bob, K0AYO, and others.

Amateur radio operators, or "hams" as they are often called, since the conception of the hobby itself, have always been striving for achievement in that part of the hobby that appealed most to the individuals themselves. At first it was the struggle to achieve any degree of success, whether it was a successful construction project, a QSO across town, or a QSO across an ocean. While many amateurs have been satisfied with just "chewing the rag" with local friends, the desire of many to achieve operating accomplishments has led to the various awards programs that have proven to be so popular down through the years.

Starting in the 1930s, some original operating awards were the International Amateur Radio Union's Worked All Continents award, followed by the popular American Radio Relay League's Worked All States and *CQ* magazine's popular Worked All Zones and Worked All Prefixes programs. The latter, coupled with the ARRL's DX Century Club, appealed to the many amateurs primarily interested in working foreign countries.

The resumption of amateur radio following World War II led to greater efforts by most hams to achieve even greater degrees of success in their operating efforts. As new and surplus equipment became available to the average amateur, DX contacts became more plentiful. Sweepstakes' scores became higher each year, and "rare" states became easier to find and work. As the awards available for operating achievements became easier to obtain, they likewise became more popular. The founder of a very extensive awards program, Clif Evans, K6BX, sensed the need for awards of various types to be available to any worthy amateur radio operator. During the 1950s K6BX created and developed the Certificate Hunters Club, which immediately proved popular with many hundreds of amateurs who could work to achieve one or many certificates or awards created by K6BX. One of the most popular of his awards was the USA-CHA, or the County Hunters Award.

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The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

In 1960 county hunting activity was well underway. Certificate Hunters Club chapters were established in many states. K6BX had become associated with *CQ* magazine, which provided a widespread medium for the collection and distribution of information and news of County Hunting activity. The USA-CA Awards were created in the following classes: USA-500, USA-1000, USA-1500, USA-2000, USA-2500, and USA-3000. *CQ* printed and made available *USA-CA Record Books.* These books, which are necessary to obtain the awards, are available from *CQ*.

At its height, the CHC organization had over 4000 members in 175 countries. Early county hunting was quite different, as most counties were worked with fixed stations due to the lack of mobiles.

When Record Books started coming in for the Basic, or 500 Counties, Award, it was difficult to decide who was number 1, so Clif gave out #1A through #1Z to the first 26 applicants. K6BX was first listed in the June 1961 issue of *CQ* as custodian of the USA-CA Awards Program.

In July 1961 hundreds of *USA-CA Record Books* were mailed, and in that same month the complete rules were published in *CQ*. October 1964 was the last column written by Clif for *CQ*. In December 1964 the first article appeared by Ed Hopper, W2GT, the new USA-CA Awards Custodian. Ed conducted the column for 18-1/2 years, his last column being in the June 1983 issue.

The next custodian of the USA-CA Award and the author of *CQ*'s "Awards" column was Dorothy Johnson, WB9RCY. Norm Van Raay, WA3RTY, assumed the role in January 1993.

The first amateur to qualify for the USA-CA 500 Award was K2PFC. W4UF was the first YL to work 500 counties. DX stations also were interested, with PJ2AF, ZL1TB, TG9AD, KL7MF, SM5WI, DL1QT, SM5CCE, and KH6DKA also qualifying late in 1961 or early 1962. The first station to work 1000 counties was K4AI.

There were no specific frequencies or nets for county hunting initially. Very few even dreamed of working all USA counties! AM was still the common mode of phone operation. While W9JR was the first operator to work 500 counties from his mobile, mobiles were not yet recognized by most as a possible source of county contacts. Most contacts were made on 40 meter phone, and in 1963 a net was developed with county hunting the main activity. Also, the CHC net and ISSB net on 14,333 kc was used by County Hunters. In March 1963 the ISSB net moved to 14,332 kc, and the CHC net moved to 13,340 kc. The 40 meter net ran through 1966, when it was forced to disband due to foreign broadcast stations taking over the frequencies. Recent efforts to re-establish a 40 meter net on 7,240 kc have been only partially successful due to broadcast QRM and poor band conditions.

Some of the farsighted county hunters who created a 7,225 kc 40 meter net in 1963 were K9UTI, K9EAB, K8IQB, K8CIR, K8IWI, and K8KOM. It was at this time when mobile units started their real contribution to county hunting. On September 5, 1963 K9UTI contacted W5JUG/M on 40 meters and stayed in contact through 40 counties. K9UTI enlisted help from K9EAB, and the 40 meter net was off to a good start.

K9EAB was the first outstanding county hunter, and he did it all from an iron lung! Helped by many mobile operators, including his Dad, WA9DCQ, who made the first of many county expeditions yet to come, Cliff Corne, Jr. was the first amateur to finish working all counties on August 14, 1965.

In 1966 the 40 meter net was being rap-

Box 76, Pleasant Mount, PA 18453-0076

idly abandoned due to broadcast QRM and the need for longer skip to contact more remote counties. As most county hunters were also members of the Certificate Hunters Club, county hunting increased even more on the 14,340 kc CHC net. As is often the case when many group together in any kind of an organization, differences of opinion arose. There were those active in the CHC and on the net who objected to county hunting on the 14,340 kc CHC net. This led to the creation of the 14,336 kc Independent County Hunters Net in November 1966. Founders of this net were WA4BMC, K8CIR, and WB2FVO. This net was devoted primarily to county hunting, with many mobiles quickly joining the ICHN on 14,336 kc.

About this time K6BX resigned from the staff of *CQ* magazine to direct the CHC-FHC organization from his home in California. However, *CQ* kept the USA-CA Awards Program and column under the direction of Ed Hopper, W2GT. The "Awards" column has always appealed to the many readers of *CQ* who are interested in county hunting and other available awards programs. Current accomplishments are listed in each month's edition, along with special write-ups of successful "3076'ers," as those who have worked all 3076 counties in the United States are called.

USA-CA All Counties Award holders gathered in Springfield, Missouri, June 1994, the 25th anniversary of the founding of the Mobile Amateur Radio Awards Club (MARAC).

The USA-CHA award under K6BX was changed to 300 county step classes. One rule stated that the mobile could claim the county he was running for a county worked for himself. As with many things, time causes changes, and as of today the USA-CHA award is no longer available.

County hunting has increased greatly over the last few years. Hunters are found

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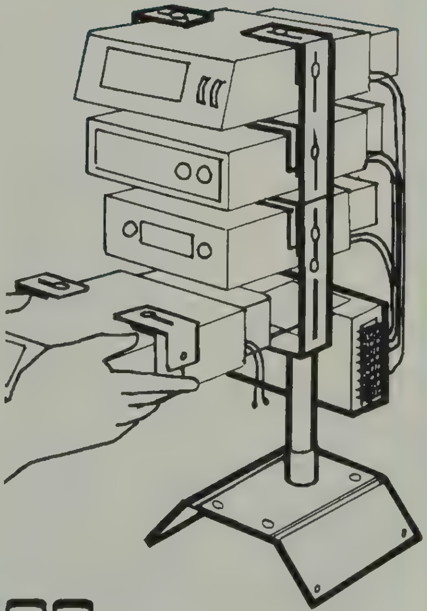

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CIRCLE 70 ON READER SERVICE CARD

County hunters and families at the MARAC 25th anniversary convention in Springfield, Missouri, June 1994.

on every band. The arrival of SSB and attention given to mobile operation by manufacturers of amateur equipment have contributed to this growth. There are even some who operate mobile CW while county hunting. There are at least two nets devoted to CW county hunting activity. And there are some who operate aeronautical mobile.

County hunting has developed a fellowship among the members of this group that defies any description. Competition is friendly, and cooperation and assistance are the order of the day. While every effort is made to contact counties, county hunters, true to amateur tradition, are always ready to help in any emergency that might arise. There have been many incidents in which CHers devoted many hours at considerable expense assisting in emergencies.

County hunters are always welcome at other CHers' homes. To meet together for an "eyeball" QSO is a very common thing. A few met together on March 8-9, 1969 in Jackson, Mississippi, and from this meeting the concept of the Independent County Hunters Net Convention was formed. The first ICHN Convention was at Mountain Home, Arkansas, the 4th of July weekend in 1969. K5KDG was the host. From this convention came the plaque award for the ICHN County Hunter of the Year. The first recipient of this coveted award was WB2SJQ. It was at this time that the ICHN 303 Award was conceived by W0SJE and WA0WOB.

The second ICHN Convention was held in Knoxville, Tennessee, the 4th of July weekend 1970. Those attending who had worked all 3079 counties were asked to select the County Hunter of the Year. The group selected K2PFC, the second amateur to earn this coveted plaque.

The Third ICHN Convention was actually the first MARAC Convention and was held over the July 4th weekend 1971 in Kansas City, Missouri. The County Hunter of the Year was W4HA, selected by the 3079'ers. MARAC applied for a special convention amateur call for the convention and used KC0KC.

The conventions have proven to be very successful social affairs. Here everybody has the opportunity to become acquainted with all those "voices" heard so consistently on the nets or to meet that mobile operator who gave out the last county to complete them all. Then there's the 303 Room, the real "happy" room. And the net committees meet to discuss ways to improve net and mobile operation. Suggestions also are made to improve net controls.

Seminars are given on mobile rig installation, how to combat motor noise, mobile antennas, and many other aspects of mobile operation. A special events station with a special prefix call is always in operation to "talk in" the mobiles arriving from far-away places. Pictures are taken, and manufacturers exhibit their latest equipment. A banquet is the final highlight, with entertaining speakers and prize drawings. While attendance at the first convention in Arkansas was less than 100, the 1971 convention in Kansas City drew attendees in the hundreds, and the num-

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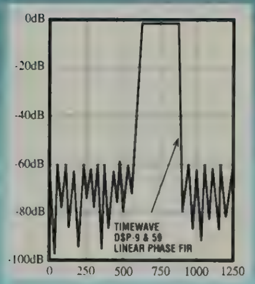

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bers have grown every year since then.

These amateurs come from all over the country and the world. ZL1KG and TG9UZ are two popular county hunters who have actually worked all USA counties. Both DX county hunters, along with SM5EAC, attended the 1971 convention. The convention in Abilene, Texas in 1989 was attended by ZL2BCX and VK5QW. Several other overseas county hunters are getting close to the coveted 3076! The DX county hunters are to be especially admired for their persistence in overcoming the QRM and solar flares for the last couple of years.

Mobile County expeditions are very popular. One of the most extensive ones was run by WB5DVT and W9SDK in March and April 1972. These two county runners gave out every county in Texas over a nine day period! They ran up 7500 miles and made almost 10,000 contacts —a record that will stand for a long time!

As of September 1994, 849 amateurs have been successful in working all counties and receiving the USA-CA All Counties Award. It is believed that several hundred more lack 100 or less counties to have them all. Many of those who have worked them all stay around the nets acting as net controls, running county expeditions, and helping newcomers in this phase of amateur radio. Some are even trying to work them all a second time or a third or fourth time!

An award is available to those who contact those who have earned the USA-CA All Counties Award. This award is the Cliff Corne, Jr., K9EAB Memorial Award. WA0JRZ was the first custodian of the Cliff Corne, Jr. Memorial Award. The original Cliff Corne, Jr. Memorial Trophy was retired in 1992 after having been held by the County Hunter of the Year each year for several years. The MARAC Awards custodian was the custodian of the Cliff Corne, Jr. Memorial Award. The theme of the 1972 ICHN Convention was in honor of K9EAB, by then a silent key. The convention was held in Peoria, Illinois, Cliff's home town, and Cliff Corne, Sr. and Mrs. Corne were the guests of honor. Cliff Corne, Sr. spoke to the group at this convention and told with tears in his eyes how he and his wife drove to Nebraska to give Cliff, Jr. his last of all counties for the whole ball of wax.

Many awards for county hunters were originally available from the CHC and its chapters. However, a new group was formed several years ago by a group of dedicated amateurs in the Kansas City area. This group created MARAC, the Mobile Amateur Radio Awards Club, Inc. It started out with 100 charter members, and the club has grown to over 2500 members primarily interested in county running, awards for county hunting, and mobile operation. Many worthwhile awards are available from MARAC for County Hunting accomplishments.

A club newsletter originally published by W0YLN and presently published by K0AYO is sent to the membership each month. Members operating mobile, using the club's call WB0DPD, have given out many counties in most of the United States. The MARAC Information Bureau was originally handled by Bertha, WA4BMC, and provides information on MARAC. MARAC has developed and maintains an up-to-date information packet that is tailored to the newcomer to county hunting. It is a good introduction to county hunting, with references to many sources for material and other information for the prospective county hunter.

During the early part of 1989 MARAC undertook this major rewrite of the information packet, originally an introduction to MARAC. The new packet is now a major introduction to county hunting and is available for an SASE from MARAC Information Bureau, 406 Cherry Park Dr., Sherman, TX 75090-6709. Quantity shipments of the packet for club or convention meetings may be had from the Info Bureau.

To receive confirmation of counties when working mobiles, county hunters must send the mobile operators a "county hunter reply card." This "CHRC" card is completely filled out, self-addressed with postage stamp so that all the mobile operator needs to do is check the card for accuracy, validate it with his or her signature, and drop it in the mail. Mobile reply cards are available from a variety of sources, including several active county hunters.

As stated before, confirming the counties was an individual's responsibility. In 1971 Dave, W6CCM, organized the Mobile QSL Bureau, which was located in Lakewood, California. Dave and Barb did a tremendous job, saving many dollars in postage to the users of the bureau. In 1985 the bureau operation was accepted by Gwen, N0COL, and Jerry, N0CKN. Location of the bureau was moved to Des Moines, Iowa, and subsequently to South Carolina. Another QSL bureau was established in 1994—Amateur Communications Exchange Services (ACES), 15020 N. Seventh Dr., Phoenix, AZ 85023-5214.

In April 1972, under the direction of K1OME and WA0ZCQ, the first SSB CH Contest was held. Net frequencies were not used. Even so, many made over 1000 county contacts over a three day period. The SSB contest continues to this day, and currently a separate CW contest is held each year. N6QA is the current CW contest chairman and WA5DTK is the current SSB contest chairman.

MARAC membership continues at its present level. New awards are created and new goals reached. It was quite an accomplishment to put out all counties in each of the 48 states, then all 50 states, and finally all counties were put out by one mobile, Ken, KB7QO.

MARAC also keeps updating the awards program. In 1987 the USA Counties Award #1 was given to N0GYN, and several others have since qualified for this award. A new award was created in the fall of 1987, the Five Band Counties Award, which is a popular award, with many persons having received it as of June 1993. This award is available for working 1500 counties on any band 75 through 10 meters. Plaques for working all counties on a band and a trophy for all counties on all bands are the other steps in this award series.

One of the ongoing problems of an awards organization is the keeping of the records. During the first half of 1988 WA0RJJ produced a major computer program tailored for MARAC to automate the awards process and keep the records. During the latter part of the year it was implemented and tested with significant good results. Previous award applications that could have taken about 15 minutes to process now take significantly less time to process. Records are automated, and the piles of paperwork that come in daily are a lot easier to handle now. As of this writing there are over 50,000 award records in the system, and as time goes on, more will be added. One very significant factor in processing the awards was the addition of a laser printer to the computer during the first part of 1990. The use of the laser printer has very significantly reduced the amount of time required to produce each award certificate, and at the same time has materially improved the quality of the certificates.

As of September 1994, 2800 county hunters from all over the world have been issued the USA-CA 500 Counties awards sponsored by CQ, attesting to the popularity of the program. Even more impressive is that 849 amateurs have been issued USA-CA All Counties awards.

In 1981 MARAC Headquarters was transferred to the Twin Cities of Minnesota; in July 1993 the HQ function moved to the Dallas, Ft. Worth area of Texas.

Summary

We hope this brief history gives you some idea of how it all came about. The writer is indebted to *CQ* and the following amateurs who contributed information, making this article possible: K3LXN, W0KZZ, K9UTI, W0BL, WA4BMC, W9JR, K4LSP, WA0SHE, W4HA, W7PXA, WA4MGC, K4FPF, K9KKX, K9DCJ, W0AYL, and WB2FVO.

Good luck, county hunters, and happy travels!

73, Norm, WA3RTY

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DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

50 Years of DX

CQ magazine isn't the only DX-related activity to celebrate its 50th birthday in 1995. On November 15, 1995 the DX Century Club (DXCC) will mark 50 years since its re-start following the end of World War II. While there is more to DX than the DXCC program, that award series remains the premier challenge in DX. The last 50 years of DX have been closely intertwined with the DXCC program. The changes in the DXCC program over the years have had as profound an effect on DXing as the ups and downs of the last five sunspot cycles.

But the history of DX is far more than a single award program, and more than changes in the number and definition of so-called "countries." The history of DX is really the story of a few dozen individuals whose words and actions have left their permanent imprint on DX. In this column we will focus on some of these DXers and see how they helped shape DX into its present form. (Those DXers who want some more of the details of the coming and goings of DXCC countries and other DX events may wish to consult Ellen White, W1YL's DXCC history series in 1981–82 *QST*.)

Mats, SM7PKK, continues in the tradition of Scandinavian DXpeditioners heading for warm, and rare, places.

The Beginnings

The current DXCC program started at 3 AM Eastern time on November 15, 1945, the time when US amateurs regained use of the 10 meter band following the end of WW II. The DXCC program existed before that war, but ARRL officials decided that the four years of forced inactivity justified a fresh start for the program. Thus, all pre-WW II countries credits were wiped clean, and all DXers started on an equal footing in 1945. (This decision to ignore all pre-war DX contacts provoked some controversy at the time, but nothing like what has erupted whenever similar proposals surfaced in more recent times!)

While post-war DXCC represented a fresh start for DXers, the same cannot be said for the DXCC countries list. The competitive underpinnings of DXing date back to the earliest days of amateur radio. However, the use of "countries" to quantify one's DX standing can be traced back to an article by Clinton B. DeSoto, Assistant of the Secretary of the ARRL, in the October 1935 issue of *QST*. DeSoto proposed a DX scoring system based on the number of "countries" worked and confirmed. Rather than list all possible countries, DeSoto suggested a "simple and direct" basic rule to determine same: "Each discrete geographic or political entity is considered to be a country." Over the next 60 years that "simple and direct" rule would be expanded and refined to fill an entire printed page and would generate untold arguments, articles, discussion, and controversy (not to mention a lot of *CQ* DX columns!)

The post-war DXCC countries list was based primarily on the pre-war list, somewhat revised since 1935. Some political changes due to the war plus some operations from previously overlooked regions produced some changes in countries, but the first modern DXCC countries list, published in February 1947, essentially grandfathered many of the pre-war "discrete geographic and political entities." DXers in years since who have wondered why certain countries remain on the DXCC countries list can blame DeSoto. That first modern DXCC countries list contained 257 "countries."

The 1940s

The 1940s saw some other DX milestones. W1FH earned the very first modern DXCC membership and received DXCC certificates #1 for both Mixed and Phone DXCC in 1947. Another item in the July 1947 issue of *QST* marked the beginning of an enduring DX activity: the first

Iris, W6QL, and the late Lloyd, W6KG, Colvin, DXpeditioners extraordinaire, in ex-southwest Africa ZS3 (now Namibia V5).

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addition to the DXCC countries list. The Isle of Man GD was added to the countries list as there was "enough political difference" between it and the other British islands to justify a separate listing. The process of adding countries to the DXCC list would evolve dramatically over the next 50 years! Also, 1947 saw the publication of the first DXCC Honor Roll, then limited to the top ten DX "men." W1FH retained his number one ranking, with 168 countries. The first SSB QSO was made in 1947, between W6YX and W0TQK. Finally, Ron Newkirk, W9BRD, assumed editorship of the "How's DX" column in *QST*, a position he retained for 30 years.

The year 1949 saw another DX turning point: the first deletions from the DXCC countries list. Effective April 1, 1949 the country of Newfoundland and Labrador VO was deleted, as they became part of Canada. It would take almost 40 years before the DXCC countries list included formal deletion criteria, however.

The 1950s

DXing continued to evolve in the 1950s. Some enterprising DXers noted that some DXCC countries had few, if any, resident amateurs, and were thus very difficult to work. They reasoned that they could go to some of these countries and put them on the air for the Deserving. Thus, in 1951 W6SAI, W8AH, and others set out on the first major post-war DXpedition, operating as **7B4QF** from Andorra and as **3A2AC** from Monaco. From this modest start would come the mega-DXpeditions of the 1990s, such as the 3Y0PI Peter 1 Island DXpedition. Dick Spenceley, KV4AA, replaced W6QD as the DX editor of *CQ*. And DXCC credit for an operation was removed for first time. DXers' credit for 3A1A was deleted because the operation was not from Monaco. Fifteen years later a similar deletion would erupt into DX's first lawsuit. (Later that year the first of hundreds of Albanian pirates surfaced: ZA2AA. It would take 40 years to overcome Albania's distrust of amateur radio.)

In 1952 Bob White, W6YYN (now W1CW), took over the DXCC desk. Bob would hold that position for the next 24 years. More than any other single individual, Bob White is the person who built the DXCC program into the most highly regarded and well-respected award program in all of amateur radio. His meticulous card checking, his unbelievably long hours, and his fine sense of fair play were the backbones of the entire DXCC program. Every DXer knew that they would get a fair shake from Bob, regardless of their DX reputation or lack thereof. For example, when I was working at ARRL headquarters and traveling on occasional DXpeditions, Bob would sometimes find one of my DXpedition QSL cards in

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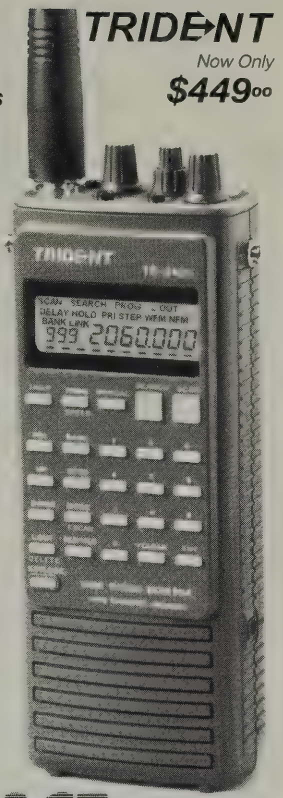

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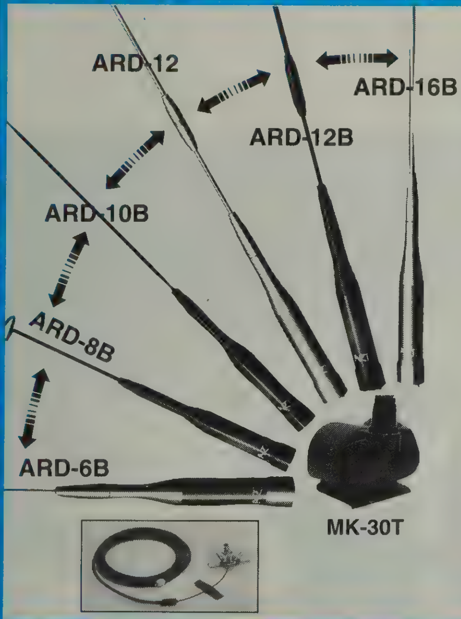

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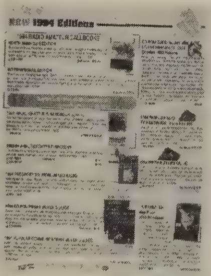

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Europe: JH0HC, N4PYD
Oceania: SP1MHV, JH0HC, N4PYD

Award of Excellence Plaque Holders: I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DE0DAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, I0RIZ, I2MQP, I5ZJK, JA0SU, S51NU, K9XR, W0ULU, HB9DDZ, F6HMJ.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, NX0I, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCV, I2MQP, I0RIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to: "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

It took 35 years for DXpeditioners to finally break the "Clipperton Curse," but more recent DXpeditions have enjoyed good success. Shown here are DJ9ZB and F2CW on Clipperton in 1985.

The WAZ Program

Single Band WAZ

12 Meter SSB

9	OH3TY

15 Meter SSB

472	AA2GQ	474	JJ2QXI
473	IK2DUW		

20 Meter SSB

955	AA2GQ	957	KF8UN
956	IK8MVH		

12 Meter Mixed

17	I1JQJ

17 Meter Mixed

27	I2JQ	29	I1JQJ
28	W3KHQ		

10 Meter CW

146	NZ0R

15 Meter CW

259	LU2BRG

20 Meter CW

450	LU2BRG	451	K0JUH

30 Meter CW

11	I1JQJ

RTTY

93	I0KKY

160 Meters

76	I4EAT (30 Zones)

All CW

60	SM5BUH

SSB

4219	JG1EGG	4223	AH9B/W5
4220	W2OW	4224	KQ4YI
4221	IK2JYK	4225	EA1FEK
4222	K2UVG	4226	WA5TUD

CW/Phone

7497	OH3MKH	7503	K8JJC
7498	JH1LPZ	7504	PT2AZ
7499	KB2FD (CW)	7505	EA3DRE
7500	JA7ECT (CW)	7506	K0JUH
7501	KF2KT	7507	I6BDS
7502	KJ6ZH		

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

a DXCC application with a minor error. Rather than simply returning the card to the DXCC applicant, Bob would walk down the hall to my office and ask me to provide an acceptable card. Can you imagine how the DXCC applicant felt when he received his QSL cards back with the notice that the 6W8MM card was not ac-

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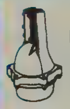

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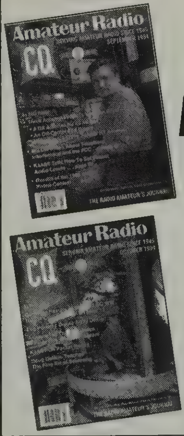

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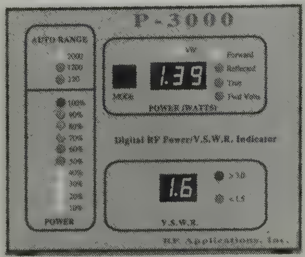

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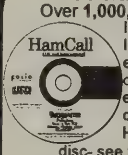

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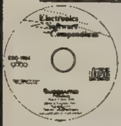

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CIRCLE 54 ON READER SERVICE CARD

5 Band WAZ

As of September 30, 1994, 398 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

4X6DK

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
K6YRA, 199 (34)
AA4KT, 199 (26)
K7UR, 199 (34)
NA0Y, 199 (26)
W0PGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
IK2GNW, 199 (1)
W9CH, 199 (26)
AC0M, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199(34,40m)
KM5W, 199 (26)
K1ST, 199 (26)
I1POR, 199 (1)
AB0P, 199 (23)
VE1AST, 199 (18)
OH3TY, 199 (2)
SM6AHS, 198 (12, 31)
UA3AGW, 198 (1, 12)
KL7Y, 198 (34, 36)
VO1FB, 198 (19, 27)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (23, 26)
G3KDB, 198 (1, 12)
DK2GZ, 198 (1, 24)
UY5XE, 198 (24, 27)
N5FG,198 (22,34 on 40)
KG9N, 198 (18, 22)
W2UE/7,198 (18,18on40)

The following have qualifiedfor the basic 5 Band WAZ Award:

DK4TA, 182 Zones
HB9DDM, 182 Zones
KT2E, 186 Zones
LU2BRG, 186 Zones
N6HL, 196 Zones
IV3MUC, 152 Zones
DK1FW, 195 Zones
K7RLS, 150 Zones
VE1AST, 199 Zones

Endorsements:

OE1ZL, 196 Zones
OH3TY, 199 Zones
4X6DK, 200 Zones
W2UE/7, 198 Zones
JA2TK, 192 Zones

924 Stations have attained the 150 Zone level as of September 30, 1994.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

cepted because of a smudged callsign, but a valid replacement card was enclosed! A small benefit, perhaps, but indicative of the way Bob approached all aspects of his job as Mr. DXCC.

In 1954 VQ4ERR earned the first phone Worked All Zones award. However, the big DX news that year was the failure of the first Clipperton Island DXpedition. Bob Dennison, W0DX, ran into boat problems, and ultimately had to be rescued at sea by the Mexican Navy. This was an unauspicious start to the concept of major island DXpeditions, and the beginning of Clipperton's long-held reputation as a bad-luck DX destination.

In 1955 an enthusiastic young man named Danny Weil got his first amateur radio license: VP2VB. He was fascinated by DX, and proposed an extended sailing DXpedition to many remote islands on his yacht *Yasme.* This marked the first multi-destination DXpedition, an idea that would dominate the 1960s. A proposal for an ARRL Board advisory committee to help determine potential new DXCC countries was tabled. It would take more than 10 years and a lawsuit to resurrect the idea.

The next year Danny Weil operated as FO8AN from French Polynesia, and lost his yacht *Yasme* near New Guinea. Danny would later set sail with the *Yasme II*, operate from many rare locations, and ultimately go through another three *Yasmes* before retiring from the DXpedition circuit.

The 1960s

The 1960s were turbulent times, in the world in general and especially in DX. Many new countries arose from the ashes of European colonies, especially in Africa. Many of these countries would remain high on the Most Wanted countries list for the next 30 years.

Meanwhile, DXers began to hear the names of three DXpeditioners: Gus Browning, W4BPD; Don Miller, W9WNV; and the Colvins: Llyod, W6KG, and Iris, W6QL. Gus supposedly put Bouvet 3Y on the air for the first time in 1962—"supposedly," because the Club Bouvet team more than 20 years later found that the beach from which Gus claimed to operate was covered with gigantic boulders! At that time, however, DXpeditioning operated under an honor system; DXers were believed to be honest.

Regardless of the Bouvet situation, Gus *did* operate from many rare locations around the world, well chronicled in *73* magazine in the late 1960s. Many were "DXpeditions of the Month," sponsored by the Hammarlund company, which also helped amateur radio operators accompany African expeditions. Gus was best known for his ubiquitous Coca-Cola bottle next to his rig. His efforts to provide to the Deserving contacts with very rare countries was much appreciated by some DXers. They not only came up with much of the cost of the DXpeditions, but they also provided Gus with a brand new Ford Mustang!

Llyod, W6KG, and Iris, W6QL, Colvin also set out on their Yasme DXpeditions in the 1960s. Over the next 30 years these two operators would travel to, and usually operate from, more than 200 different countries.

Yet another DXer set out on the DXpedition trail in the 1960s. Don Miller, W9WNV's operations eventually would profoundly alter the entire DX world.

Don Miller may have been (and may still be) the most talented DXpeditioner ever. Don would take extended leaves from his medical practice to travel to some of the rarest and most difficult-to-work countries in the world. His CW skills were unrivaled.

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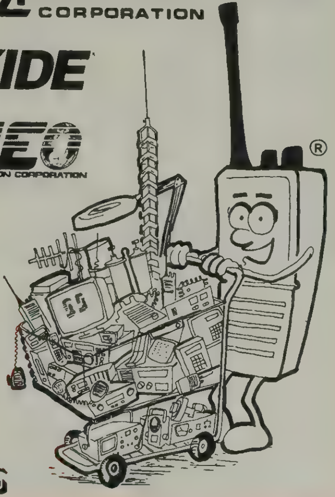

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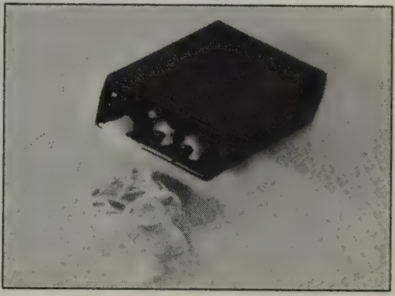

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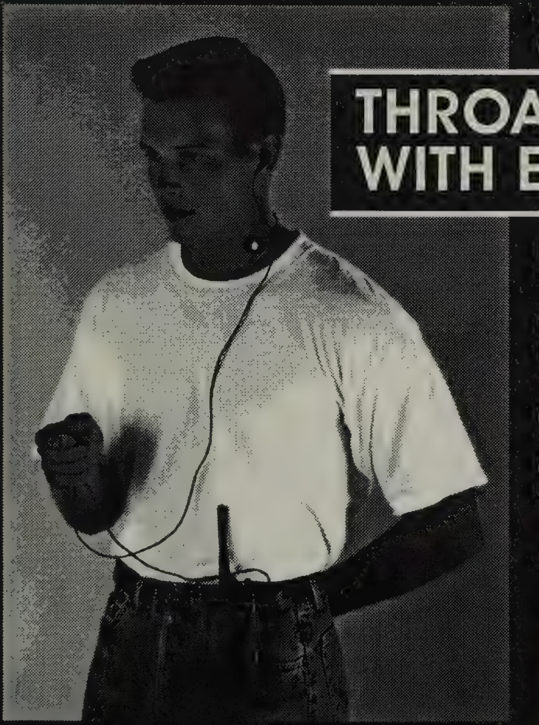

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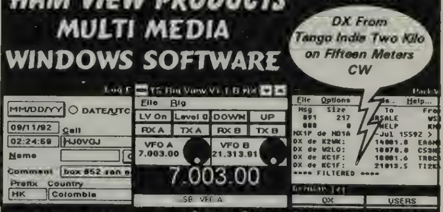

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Don would listen to the pileup of calling stations, and then come back to 5-6 *complete* callsigns, copied out of the cacophony of dits and dahs. No other CW operator has come close to this level.

Don raised money for these DXpeditions through a "fan club" of supporters. Don would offer direct confirmations of contacts with members of this fan club, and would even be able to pick their callsigns out of the pileup more quickly than callsigns of non-supporters. Those DXers who helped Don in his DXpedition travel were rewarded with expedited contacts and QSLs.

Controversy soon arose, however. At times Don appeared to work stations that were not in the calling horde. He would acknowledge the call of a supporter while that individual was at a local radio club meeting. Although never proven nor admitted by Don, this practice seemed to be sufficiently widespread to attract the attention of some prominent DXers.

Furthermore, Don seemed to go suddenly deaf when certain stations called. Some DXers high on the Honor Roll who didn't support Don financially, or who demanded investigations into whether contacts were necessary for confirmations, were unable to break the pileups on Don. At least, they were unable to do so under their primary callsign. If they used another, less-known callsign, Don would pull them through in an instant! Don claimed that he maintained a "black list"

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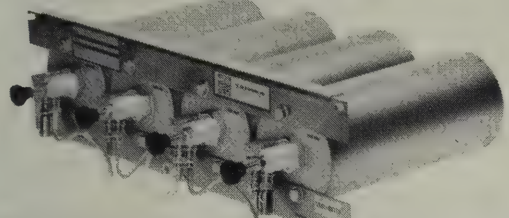

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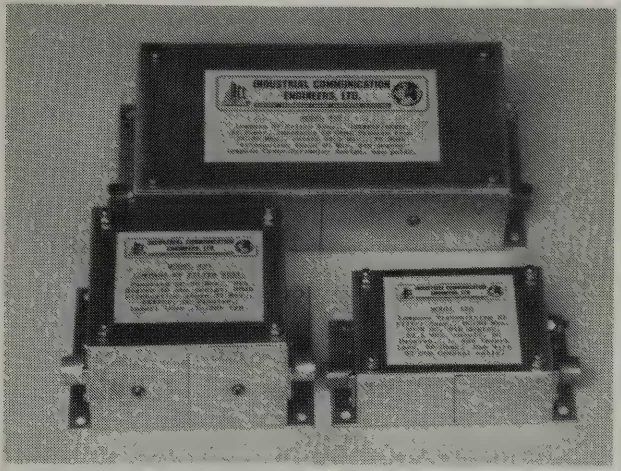

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1Z9B to AA6BB
3D2CA to I4ALU
3D2QB to SM3CER
3Z0UN to SP8KEA
4J3M to UD6DJ
4K9W to DL6KVA
4L0G to RF6FM
4L1AA to CT1CJJ
4L50 to CT1CJJ
4N70AL to YU7AL
4N70AT to DC3SZ
4N70DX to YU1DX
4N7DW to YU7BJ
4X6UO to WB3CQN
5H3JB to NK2T
5H3JD to DK9MA
5N0DEY to WB7F
5N0GC to F2YT
5N0MVE to ON7LX
5N3ALE to DJ2VZ
5R8AL to WA4VDE
5R8DL to JH8YZB
5T5JC to F6FNU
5U7Y to JG3UPM
5W0BL to JH2ABL
5W0BY to JA2FBY
5W0JA to JF2RZJ
5X1F to WB1DQC
6V1A to 6W6JX
7Q7LA to G0IAS
7Q7RM to G0IAS
7Z1AB to KN4F
9A8AA to YU2VC
9G1BJ to G4XTA
9I30ZIN to 9J Bureau
9J2BO to W6ORD
9K2MU to WA4JTK
9K2YAZ to N2YAZ
9K2ZC to KC4ELO
9K2ZZ to W8CNL
9M8BT to N5FTR
9V1YC to AA5BT
A22EX to N4CID
A35MW to VK2BEX
A35RK to KK6H
A35VI to K8VIR
A35XC to JE1DXC
BO0M to BV2KI
BZ1QL to BY1QH
C53HG to W3HCW
CI9HF to VE1NH
CP4CR to IK2UVU
CP8XA to CP8AL
CP94USA to CP1AA
CS8EGW to CT1EGW
D2SA to F6FNU
D3X to CT1EGH
EA8BYR to WA1ECA
EK4JJ to GW3CDP
ER3MM to I8YGZ
EU1YL to UC3AB
EU7SA to RC2SA
EV1F to UC2AFC
EW3LB to W3HNK
EX0A to DF8WS
EX0V to DF8WS
EX8DX to F5OJO
EX8F to DL8FCU
EY8WW to DL8WN
EZ5AA to DF7RX
F5LGF/TT8 to F5LGF
FG5GZ to F6CLK
FK8FI to F6GZA
FK8FU to NA5U
FK8GJ to F6CXJ
FK8GT to F6GZA
FO0MIZ to JA1HGY
FP/KA1NCN to AA1AS
FR5ZU/T to VE2NW
FS5PL to FG5BG
FY5GJ to F2YT
GB3010TA to G3PMR
GP5KN to G4TTX
H44KA to K2PF
HC8JG to WA6ZEF
HL9BS to N2BSA
HL9DC to N7RO
HP1XXD to N4NFM(94CB)
HS0ZBJ to W8GIO
HV4NAC to IK0FVC
I1A/0SG1 to I1RBJ
IC8SDA to IK8CQH
IS1A/0S1A to I1RBJ
IS1A/1P to I1RBJ
IY4FGM to I4IKW
IZ6ARI to I6LKB
JD1BIE to JA8FCG
JW0GB to LA8PF
JW0H to LA5NM
JW0I to SP3ASN
JY8FN to DK9FN
K0SN/CY9 to K0SN
KG4JO to WI2T
L3CW to LU6BEG
LA1Z/P to LA6LHA
LX9UN to LX1NJ
LY40MR to LY1BZB
N9JCL/CY9 to K0SN
OD5/SP7LSE to SP7LSE
OD5JY to OE6EEG
OD5MM to HB9CYH
OH0/OZ5IPA to OZ5AAH
OH0BDA to OH2BDA
OH1NOA/OD5 to OH1MRR
OM5XX to OK3CQR
OM9SIAD to OK3CTA
OQ50USA to ON4RAT
OS7YY to ON7YY
P20VH to VK4CRR
P29VH to VK4CRR
P40MX to JR4PMX
P40YL to JH4RHF
P49T to W3BTX
PJ7/OH2LVG to KE7LZ
PJ8X to KE7LZ
PY0FF to W9VA
R0/G3MHV to G3MHV
R0/KA6ZYF to KA6ZYF
RA0A/K4EWG to K4EWG
RK1OWZ to WA7OBH
RK4WWQ to AA4NU
S01MZ to EA2JG
S0RASD to EA2JG
S21ZG to W4FRU
S50R to S51SO
S61YC to AA5BT
SN0PR to SP6FER
SN0UN to SP8KHT
SV/WY3V to WB2RQW
T30BH to ZL1AMO
T31BA to DL2ZAD
T31BB to DF6FK
T32Z to N7YL
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T92X to KA9WON
T99W to DL1QQ
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TA2DS to WA3HUP
TA2ZI to WB6EQX
TM2H to F5JCG
TM4C to F6KAR
TM5FFI to F6KDF
TM9RAT to F6KED
TN0CW to DK7PE
TN1AT to F6FNU
TO5ORC to FM5CW
TR8CA to F6CBC
TT8/F5IXR to F5MXH
TT8PS to F1OIJ/F5OIJ
TU2ZR to SM3DMP
TU4EI to W3HCW
TY1IJ to DJ5IO
U5WF/UR9P to SP5IUL
UA0KAH to G4AYO
UA0QBA to UC2WP
UE9WML to KA6ZYF
UE9WTL to G3MHV
UK7R to UA9AB
UK8BA to ON7GB
UK8FF to W3HNK
UK8QU to K9FD
UN7R to UL7RE
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UT5DX to OZ7NB
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V29PE to G3DLH
V31DW to W6YLL
V31ML to N5FTR
V31RD to G4SMC
V47KEP to DL8WAA
V85BG to G3JKX
V85KX to G3JKX
VE9AE to VE1ABD
VK1FF to WB2FFY
VK6DX to AB4ZD
VP2EHF to KA3DBN
VP2EP to DL8WAA
VP2VE to WA2NHA
VP2VI to AB1U
VP5/AB5MF to AB5MF
VP5JM to W3HNK
VP9MZ to WB2YQH
VQ9GB to KF7TA
VQ9KC to AA7AN(93CB)
VQ9MZ to K8XF
VQ9QM to W4QM
VQ9TP to N5TP
VR2IH to G4RGK
VS6WV to K0TLM
XL9HF to VE1NH
XR6T to CE6TC
XU7VK to HA0HW
XX9AS to KU9C
YI1DZ to WA4JTK
YP700BV to YO6EZ
YS1DRF to W2PD
YS1XS to WD4PDZ
YW171LM to WS4E
Z21BA to N5FTR
Z31GX to YU5GBC
Z31PK to YU5XVD
Z32DJ to YU5FK(93CB)
Z37GBC to YU5GBC
ZA/KA6ZYF to KA6ZYF
ZA1AJ to OK2PSZ
ZA1B to HB9BGN
ZA1J to I2MQP
ZD8OK to N8ABW
ZD8Z to VE3HO
ZF2AH to WA6VNR
ZF2GT to N0TG(93CB)
ZL3KG to WB6EQX
ZP7AA to ZP5AA
ZZ7DX to PP5LL
ZZ8SA to PW8NG

of some operators who consistently ignored his requests for no tailenders, etc. However, some DXers felt that this black list was comprised of non-supporters, not poor operators.

Whatever the reason behind Don's inability to copy certain callsigns, the result of the practice was to rearrange the Honor Roll, pushing the DXCC totals of his supporters ahead of those of his detractors. This controversy exploded in 1967.

Under prodding by some prominent DXers, including some on Don's black list, the ARRL Awards Committee investigated some of Don's recent operations, including Navassa Island, St. Peter & St. Paul Rocks, Laccadives, Chagos, and Heard Island. Based on the Committee's determinations that Don lacked either proper licensing and/or landing permission in these cases, DXCC credit was either denied or withdrawn.

In the case of Navassa, Don and fellow DXpeditioner Herb Klein, K1IMP, were clearly on the island, and had FCC licensing authorization. However, Don never obtained permission from the US Coast Guard to land on the island. Don claimed that the DXCC rules didn't mention need for permission from non-radio authorities, but the League didn't want to encourage DXpeditioners to flaunt the law. DXCC credit for K1IMP/KC4 was withdrawn.

DXCC credit for Don's alleged PY0XA operation from St. Peter & St. Paul Rocks was withdrawn because Don had been in Caracas, Venezuela, within hours of the start of his PY0XA operation, some 2000 miles away. Don claimed that he was indeed on the Rocks with Herb Klein, and that he didn't need to provide additional ship's logs, port clearances, etc., as these documents were none of the ARRL's business. (Don subsequently admitted under oath that the PY0XA contacts had been made from shipboard near Tobago, 1800 miles from the Rocks.)

Similarly, the Awards Committee felt that Don didn't have an Indian license for the Laccadives, and probably wasn't operating from that island chain. He was spotted in the Seychelles before and after the alleged operation from the Chagos too soon for any reasonable sailing vessel. The Australian authorities said that Don's reciprocal license as VK2ADY/0 didn't include Heard Island permission, and it was unlikely that anyone would go near the storm-swept Antarctic island in the middle of July, winter in the Southern Hemisphere. (Don's photograph of Heard Island, supposedly showing he was actually there, was identical to a photo in *National Geographic* magazine.)

Faced with loss of DXCC credit for so many major operations, Don filed a lawsuit against the ARRL and General Manager John Huntoon personally, alleging defamation and demanding $550,000 in damages. This lawsuit was eventually dismissed, and the above operations remained uncredited.

The Don Miller affair led to many major changes in DXing and DXCC in particular. First, the Awards Committee essentially stopped taking DXpeditioners at their word that they were operating from the specified country with proper licensing. The Awards Committee began demanding supporting evidence for *all* DXpeditions. (This was later relaxed for most common DXpeditions, but continues to be rigorously enforced in many cases.)

Second, the League's Board of Directors finally approved the concept of advisory committees—groups of volunteers knowledgeable in a given field to provide assistance in determining what constitutes a new DXCC country, for example. The most vocal proponent of a DX advisory committee was none other than Don Miller!

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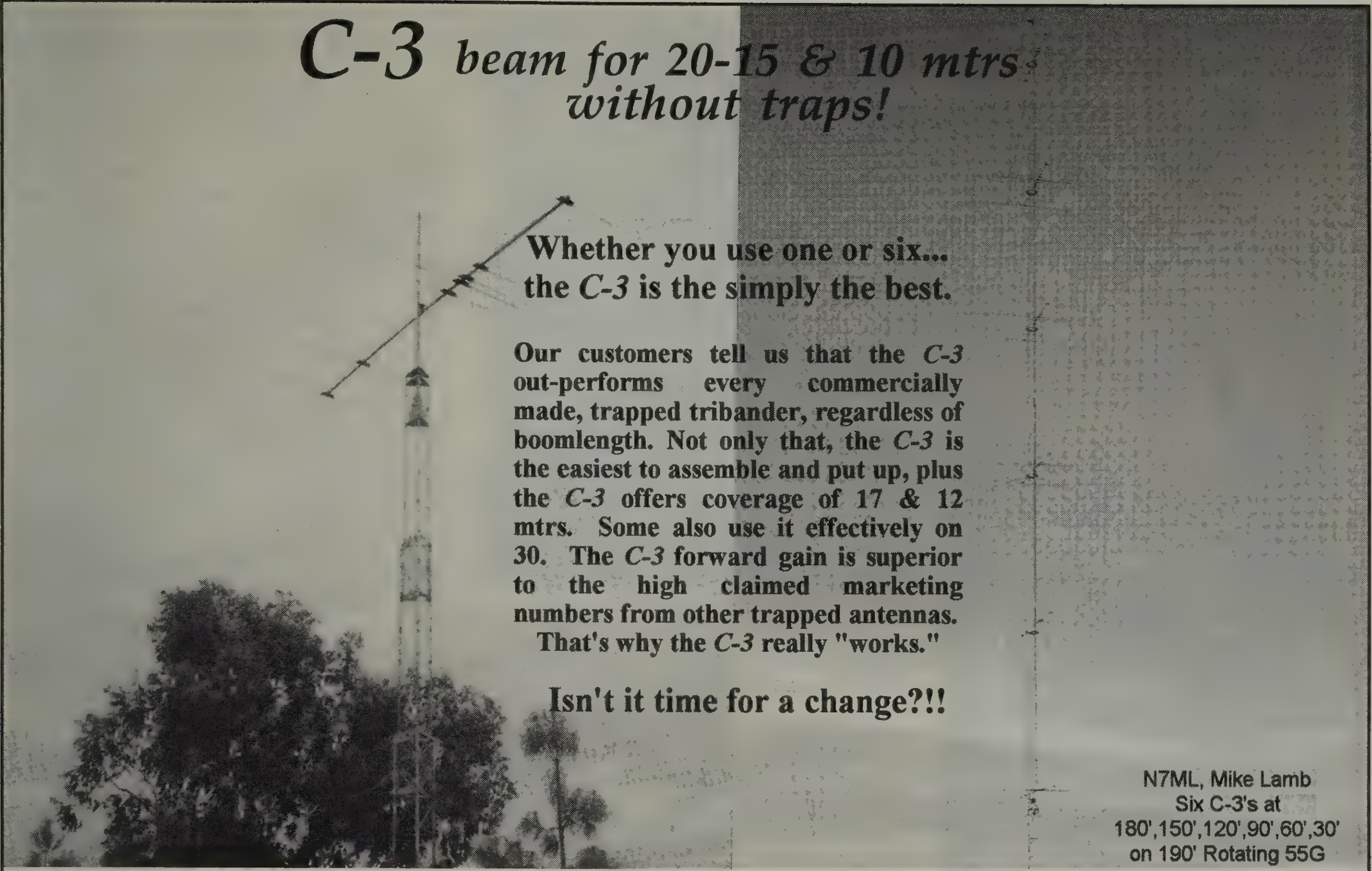

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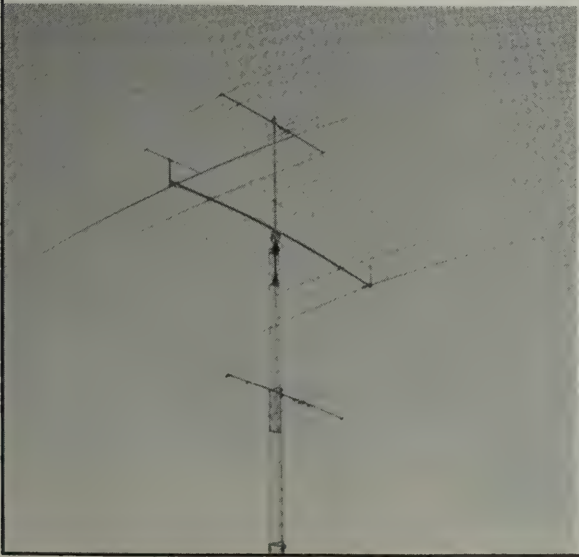

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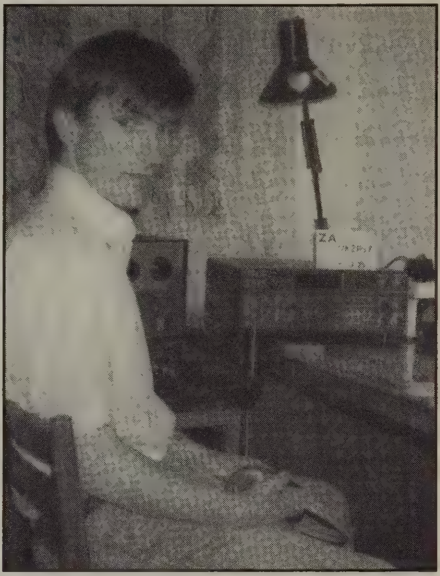

Vit Kungar, ZA1AJ, demonstrates that even the rarest country can eventually become commonplace in the world of DX. (KD0JL photo)

Probably the most important consequence of the Don Miller affair was a coming-of-age of the DXCC program. This high-profile case reflected the increasing importance (and costs) of the DXCC program. The incident marked the end of the gentlemanly approach to DX and DXing, and pushed the DXCC program into the turmoil and self-examination that marked the outside world in the late 1960s. DXing and the DXCC would never be the same.

The DXCC country criteria were refined in the mid-1960s. The most important change was publication of the specific mileage separations necessary to produce a New One. After reviewing the previous, informal determinations (remember the "discrete geographic entity" from the 1930s?), the ARRL adopted the present 225, 500, and 75 mile separations for islands, island groups, and foreign land.

Another example of the ever-repeated nature of the DX world was seen in 1967: ARRL Director Griggs proposed adding a minimum-size criterion to the DXCC Countries rules: one square mile. The proposal was withdrawn after discussion.

The 1960s closed with the announcement of the five-band DXCC award, designed to increase amateur occupation on bands other than 20 meters. While the award proved popular with DXers, it would drive future DXpeditioners crazy with requests for multiple confirmations and the ever-present "When are you going to be on 80 meters?" W4QCW earned the first five-band DXCC certificate.

(An unheralded incident at the time was a shaky first amateur contact by a very nervous Novice operator—WN2VDN. This operator would survive the experience and go on to a long amateur career, including working at the ARRL, writing and editing books, articles, newsletters, and DX columns, and eventually find himself the DX editor of *CQ* magazine: yours truly.—ed.)

The 1970s

If the 1960s was the decade of the DXpedition, the 1970s marked the onset of the Scandinavians. In 1971 a young Finn showed great determination and persistence to overcome numerous obstacles and obtain operating permission for Annobon Island 3C0. No one had previously managed to crack the thick wall around this African island, not even Gus Browning or Don Miller. However, that enterprising Finn, who put a New One on the DXCC countries list by operating as **3C0AN**, would go on to add more new countries to the list than any other single DXpeditioner. The Finn's name is Martti Laine, OH2BH. (For more on Martti's exploits, see his book, *Where Do We Go Next?*)

The very next year another refugee from the cold Scandinavian winter was Eric Sjolund, SM0AGD. Eric made his first DXpedition to Easter Island CE0. Over the next 20 years Eric would go on to operate from some of the rarest and Most Wanted countries in the world, always retaining his sense of humor and good cheer. His mild demeanor and sly wit made him a favorite of DX conventions.

Both Martti and Eric acknowledge their SSB contacts with a heart-felt "thank you." Any DXer working either DXpeditioner can testify to the wonderful warm feeling upon hearing that simple phrase. Here are men risking their money, health, and maybe even their lives to activate a new or rare country, and yet they are sincerely appreciative of those who go to the trouble to call and work them. Anyone who doesn't think DX and DXers are a special breed has never worked either operator!

With the main framework of the DXCC program well established in the previous decade, the 1970s saw some minor, but very significant, refinements. The CW DXCC award began in 1975, the first "fresh start" for a DXCC award in 30 years. Bob Locher, W9KNI, earned CW DXCC certificate number 1. The increasing mobility of DXers prompted a change in DXCC Rule 9: DXers could now feed their DXCC totals from anywhere in a given DXCC country. The previous mileage limits were removed.

In 1976 Okino Torishima 7J1RL became the latest new DXCC country, over the objections of the DX Advisory Committee and the Awards Committee. The island did not quite meet the 500 mile separation criteria (not 225 miles as mentioned in November). The bring-your-own-island scaffold DXpedition to activate this New One led directly to the present Scarborough Reef and minimum-size controversies.

Also in 1976 a loud, repetitious signal appeared on the amateur bands. The Woodpecker would haunt our bands for years. Eventually this high-power, over-the-horizon radar would be driven from the amateur bands by DXers beaming high-speed CW dits at the receivers, swamping the weak return echoes.

Later in the 1970s several marginal "countries" became new ones on the DXCC countries list. The addition of Sable and St. Paul Islands off the coast of Nova Scotia, Southern Sudan ST0, the United Nations building in New York, and Desecheo KP5 prompted considerable discussion in the DX community about how "separate" separate administration had to be to count as an additional DXCC entity. Subsequently, the separate-administration rule was eliminated from the DXCC country criteria.

The 1980s

The three DX factors that stand out in the last decade are the rise of the mega-DXpedition, computerization of various aspects of DX, and the first-ever comprehensive rewrite of the DXCC rules.

In 1983 two separate major DXpeditions operated from one of the Most Wanted countries of all time—Heard Island VK0. This marks the only time in the long history of DX that two separate groups with their sights set on a given DXpedition have neither deferred to the other group or joined it. The result was a profound waste of scarce DXpedition resources. The good news was DXers who missed one operation could catch the other.

The concept of a mega-DXpedition dominated the 1980s, culminating in the $200,000+ 3Y0PI Peter 1 Island DXpedition in 1994. The proliferation of single-band DXCCs, increased interest in digital and satellite DXing, and the rising costs of boat travel combined to make one-person multiple-destination DXpeditions a thing of the past. Modern DXpeditions involve a year or more of advance planning, commercial sponsorship, fund-raising of tens or hundreds of thousands of dollars, and a DXpedition operating team of as many as a dozen people. Contact totals are measured in the tens of thousands. QSLing requires computerized logs and dozens of volunteers.

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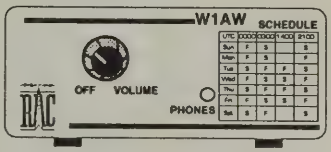

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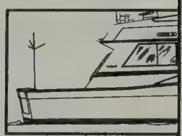

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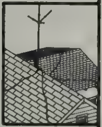

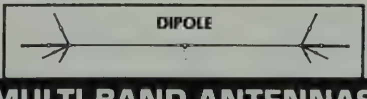

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success increase as team members can put individual skills to good use. A team may consist of a low-band specialist, top-notch CW operator, someone with the unique ability to get balky generators running in hostile environments, equipment tinkers, etc. The combination of skills can then overcome minor and even major stumbling blocks. The team approach also reduced DXpedition burn-out.

This approach also has costs, however. The most important of these is the financial costs. Transporting a dozen operators, multiple stations, antennas, and generators, food and living quarters, and all the other tons of supplies necessary greatly increases the cost per QSO. Donations become a driving force in DXing.

Another profound change to DXing in the 1980s was the increased use of computers in the activity. Computerized logging, computer-controlled rigs, computer propagation and antenna-design pro-programs, and the computerization of the DXCC records are some of the examples of how the ubiquitous silicon chip has transformed the world of DX.

The single most important change in DXing in recent history has been the spread of PacketCluster (registered). The vast array of up-to-the-minute DX information available on local nodes is simply unbelievable. The instant pile-ups on even routine DX are a result of a DX "spot" flowing through the complicated networks. PacketCluster may well be the single most influential technological advance in the long history of DX.

A final important change in DX in the 1980s was the complete rewrite of the DXCC rules at the end of the decade. This was the first such top-to-bottom effort to clean up the sometime vague wording of the rules, and to put many of the previously unpublished criteria into the rules. A flawed refinement of the "islands" rules needed a quick fix to avoid the generation of hundreds of new countries between the US and Canada, but otherwise the new rules have held up well. They have produced some new countries that wouldn't have qualified under previous versions of the rules, such as Conway Reef, Rotuma, and Ocean Island, but these changes have been well accepted by most DXers.

The polished rules provide an excellent measure of the changes in DX and DXCC over the past 50 years. Go back to the beginning of this column and reread the definition of a DXCC country. Now review the DXCC country and accreditation criteria in the current edition of the ARRL DXCC Countries List. The evolution of a single phrase into a full page of printed text reflects the evolution of DX and DXing, from simple beginnings and an accreditation policy based on the honor system to pages of legalese, lawsuits, and new-country discussions dragging on for years.

DXing is a far more sophisticated pursuit today than it was 50 years ago, but the essence remains unchanged. DXing remains a highly competitive field demanding the most from operator, station, and equipment. DXing is the pinnacle of amateur radio. DXpeditioners remain the most respected and admired amateurs. And the thrill of working an all-time New One remains undiminished.

How will DX change in the *next* 50 years? Ask me (or my successor) in 2045.

73, Chod, VP2ML

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RTTY

21	N5FG

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320	I0ZV/327	310	AB7AU/314
320	PT2TF/326	310	I0SGF/309
320	KB7VD/324	275	YB1RED/291
320	KE5PO/324	200	VE2BOG/228
320	K4SBH/323	150	EA2CLU/153
320	WB4DBB/321	28 MHz	KB7RDK

CW Endorsements

320	I1JQJ/325	275	WB4DBB/295
320	K4IQJ/323	275	K7JYE/292
275	N4OT/296	275	HB9DDZ/286
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RTTY Endorsements

200	KE5PO/248

Total number of active countries is 327. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

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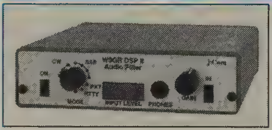

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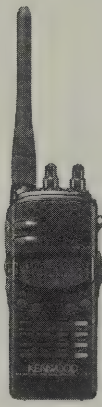
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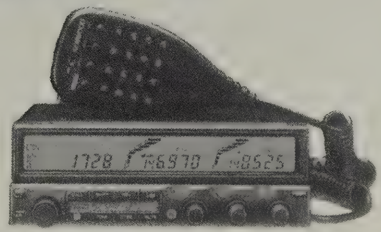
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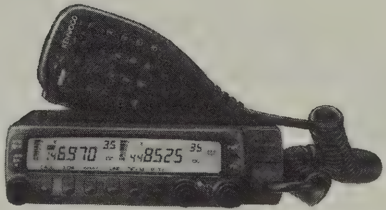
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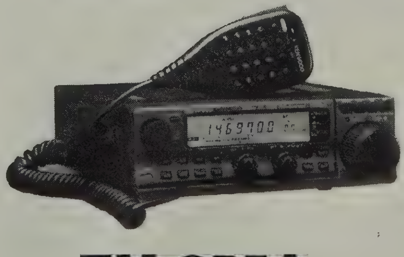
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WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

Amateur Radio—The Way It Was

It is generally agreed that amateur radio began exactly 100 years ago this year. In 1895 Guglielmo Marconi, an Italian inventor, sent and received the first radio signal locally in Italy. Although he never held a license or a callsign, Marconi considered himself an amateur. He inspired hundreds of others to experiment in radio communications.

In 1901 Marconi received the first radio signals. The letter "S" flashed across the Atlantic Ocean from England to Newfoundland. Despite nonexistent workshop equipment and reference books, the early "tinkerers" got their crude radios to function. Popularizing and advancing the radio art thus has become the legacy of the radio amateur, and the number of amateurs has since grown to more than 650,000. Today one in every 400 Americans holds an FCC-issued amateur radio license.

For the first decade of its existence, amateur radio flourished without regulation. During the period 1902 to 1912, twenty-eight bills dealing with radio were introduced into Congress. One bill even sought to have the government (meaning the U.S. Navy) retain complete ownership and operation of all wireless stations. Fortunately, all these bills were defeated. In 1909 amateur stations accounted for more than 80 percent of all stations on the air!

In 1906 "SOS" was adopted as the international radiotelegraph distress call, and it is still in use today. In 1912 the ill-fated Titanic resorted to wireless telegraphy. The international requirement that radio amateurs be knowledgeable in Morse code transmissions has its roots in maritime radio. "Mayday" was adopted in 1927 as the international distress call for radiotelephony.

Restrictions and Amateur Radio

The year that regulation finally came to radio was 1912. Uniform regulations were approved at the Third Radio Telegraph Conference in London in that year. To carry out its treaty obligations, the United States enacted the Radio Act of 1912. This was the first law for the domestic control of radio communication in general. The Radio Act placed licensing of wireless stations and operators under the Secretary of Commerce and Labor.

Historic "Regulation Fifteenth" stated that private (meaning amateur radio) stations could not use wavelengths in excess of 200 meters except by special permission. The legislation met with no organized resistance from the amateur fraternity, since they were not yet organized into an association through which they could lobby collectively.

The law makers had come up with a regulation which finally would keep the radio experimenter from enjoying his hobby on the lower frequencies that were increasingly being used by industry and the government. The radio engineers of that era determined that wavelengths shorter than 200 meters were totally worthless for commercial radio communications. From that point on amateurs would not be allowed to communicate on frequencies lower than 1500 kHz.

The regulation was signed into law on August 17, 1912 by President Taft and continues in force to this day. Amateurs were given the right to exist, but the space in which they breathed was eliminated.

One night in March 1914 Hiram Percy Maxim, 1WH (and later W1AW), an inventor and ardent radio amateur, tried in vain to contact Springfield, Massachusetts from his station in Hartford, Connecticut, some 23 miles away. His equipment could not transmit over this distance, but a station in between the two points relayed his message and also relayed back a prompt reply.

This incident led Maxim to conceive of an organization devoted to relaying messages through amateur stations across the country. A couple of months later a group of amateurs formed the American Radio Relay League (ARRL). Its purpose was not only to relay messages by radio, but also to set the stage for national representation of radio amateurs in government matters.

The useless "short waves" had been handed over to the amateur experimenters. And experiment they did! In the early 1920s amateur radio operators made a startling discovery that brought governments back into the shortwave field fast!

Early tests on wavelengths shorter than 200 meters indicated that their radio ranges were extremely limited. The signals were unpredictable and faded out quickly. What no one ever thought about was that they came in again, very often loud and clear hundreds and sometimes thousands of miles away after being reflected off the heavens.

WW I and The Postwar Years

During the World War I governments began using radiotelegraph to keep abreast of events and to direct the movement of troops and supplies. Amateur radio was silenced during World War I and came very close to being permanently silenced. The government, having had complete control of communications for the period 1917 to 1919, had more than an inclination to maintain this power. Led by Hiram Percy Maxim, the pleading of the radio amateur finally won out, and the radio hobbyist returned to the airwaves in 1919 by the hundreds.

One such amateur, Frank Conrad, operator of amateur radio station 8YK in Pittsburgh, began playing music from his garage station. In 1920 this station became KDKA, the first commercial broadcast station.

In 1922 the wavelength of 360 meters (approximately 830 kilocycles) was set aside for "limited commercial stations" and the transmission of " . . . important news items, entertainment, lectures, sermons, and similar matter." Many other broadcast stations quickly followed, and by January 1923 a total of 595 broadcasting stations were on the air—all on the same frequency! Broadcasting had arrived, and with it so had bedlam! Everyone was jamming each other. Obviously additional regulation and a system of frequency allocations were needed.

The Radio Act of 1912 did not anticipate broadcasting. In 1927 a temporary government agency called the Federal Radio Commission was established. Its goal was to alleviate some of the early technical problems surrounding broadcast radio and its 723 stations operating on the same frequency. The same act gave the Secretary of Commerce authority to inspect radio stations, to examine and license radio operators, and to assign radio callsigns.

The International Telegraph Union (the ITU) was formed in 1865 in Europe by 20 member countries to regulate telegraph communication across international borders. Telephone was added in 1885, and

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radio communications in 1906. The first ITU international frequency allocations were made in 1927. Each country was assigned a callsign block of letters with which to identify the nationality of their communications.

The United States was assigned N, K, and W and shares the letter A with some other countries. Amateur radio callsigns are assigned in sequence rather than on a request basis. Two-letter suffix callsigns are generally the mark of an old-timer. This could change soon, however, since the FCC has proposed to issue unassigned "vanity" callsigns to those who pay for them.

In 1932 the name International Telecommunication Union was adopted, and in 1947 the ITU became the United Nations specialized agency " . . . to provide standardized communications procedures and practices, including frequency allocation and radio regulations on a worldwide basis."

In the United States the basic document controlling telecommunications is the Communications Act of 1934. The act applies to all states and to Guam, Puerto Rico, and the Virgin Islands.

The Communications Act created the Federal Communications Commission (FCC), an independent government agency which would have regulatory authority over all interstate and foreign wire and radio communications. The old FRC only had jurisdiction over broadcasting. Like its predecessor, the FCC is only a temporary agency and must be reauthorized every couple of years.

The Communications Act has been revised extensively several times; this particularly occurred during the 1950s and '60s. The act requires the FCC to study new uses for radio and to encourage its development. The act also stresses the use of radio to protect life and property.

Responsible only to Congress, the FCC is charged with assigning frequencies within ITU guidelines, regulation of the various radio services and individual stations, and cooperating with federal, state, and local authorities in the preparation of emergency communications plans. Amateur radio plays a part in those contingency plans.

There are five FCC commissioners who are appointed by the president. One is designated as chairman. These appointments must be approved by the Senate, and no more than three members can come from one political party.

WW II—Off The Air Again

By 1939 there were more than 50,000 U.S. amateur radio operators happily exchanging signal reports with foreign amateurs. Then it happened! War came to Europe, and nearly half the 250 countries

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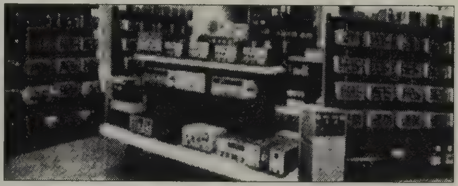

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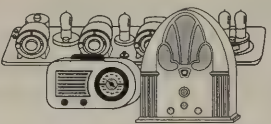
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on the DXCC list were ordered off the air by their governments. The United States tried to remain neutral.

In June 1940, however, American amateurs were restricted from contacting amateurs located elsewhere, and except for Field Day, the FCC banned all portable and mobile communications. Amateurs were ordered to send to the FCC a set of fingerprints, a passport-type photo, and proof of citizenship by October 15, 1940.

On December 7, 1941 Pearl Harbor was bombed, and the United States was immediately at war. On January 9, 1942 amateur radio was ordered to QRT by the FCC—closed for the duration. While station licensing was dropped, amateur operator licensing continued throughout the war, allowing amateurs to prove their ability before enlisting in the armed services.

Fortunately, amateur radio enjoyed a much better reputation before and during World War II than during World War I. There was a shortage of radio operators, technicians, and engineers, and amateur operators were generally recruited. Amateur radio operators were even known to sell their gear to the government. By March 15, 1942 nearly 15,000 radio amateurs were in the armed services. ARRL training books became very popular with the military.

During the war about 2000 amateur radio stations remained active for civilian defense communications. No regular amateur radio operating was allowed. They participated in the WERS—the War Emergency Radio Service. WERS was a civilian radio service that operated on the old 2½ meter (112-115.5 MHz) amateur band. Its objective was to provide communications during possible air raids. The service was administered by the local Civilian Defense Corps. Licenses went to communities, not individuals. Although WERS was very regimented and full of restrictions, it was amateur radio's only operating activity during the war.

Contrary to the World War I, when QST ceased publication, QST continued to print during World War II. QST is the monthly journal of the American Radio Relay League.

Getting Back On The Air!

In 1945 a post-war proposal for re-establishing amateur radio operation was adopted. Announced were new UHF amateur radio bands that were adjacent to military segments rather than in strict harmonic relationship with the HF bands. This was so they could be used as reserve frequencies for the military during wartime. A provision was also made for a Citizens Radio Service from 460 to 470 MHz. A new HF 15 meter amateur band was also proposed.

The war ended on August 17, 1945.

Four days later, at the urging of the American Radio Relay League, the FCC released one band back to amateur use. All FCC amateur licenses that were suspended were immediately reinstated, and so-called LSPH (licensed since Pearl Harbor) operators got to share the 2-1/2 meter band (112 to 115.5 megacycles) with the WERS until November 15, 1945.

Amateur Radio equipment 50 years ago

In 1934 a typical amateur radio station used a regenerative receiver, a Hartley oscillator, and a Zepp antenna. Advanced stations sported multi-stage crystal-controlled transmitters with homebrew or commercial superhet receivers. Driven by interest in DX, rotatable beams also began to make their appearance. 6L6's and 807 tubes surfaced. Transmission line was usually open-wire. Flexible coaxial cable was essentially a World War II development.

Interestingly, paper was rationed during the war and QST was forced to reduce its page count to save paper. But in order to " . . . be financially able to undertake the job of postwar rehabilitation of Amateur Radio . . . " advertisers were asked " . . . to use half the space at twice the rate." Amazingly . . . and almost without exception, advertisers went along with the size reduction and rate increase. A full-page increased from $240 to $480. The $240 increase was set aside to be used for reclaiming amateur radio. In November 1945 the ARRL reduced its full-page advertising rate to $325.

Just who were the amateur radio suppliers 50 years ago? They were all U.S. companies such as Hallicrafters, Jensen, Harrison, Radio Shack, Harvey, Raytheon, National, E. F. Johnson, Hammarlund, Mallory, James Millen Mfg., Astatic Corp., Shure, Henry, Globe, B&W, Sprague, Instructograph, Wholesale Radio Laboratories, McElroy, Teleplex, Vibroplex, Collins, Hy-tron, Candler, Eimac, and Electro-Voice, among others. Many of them are no longer with us.

Post-War Amateur Radio

The 10, 5, and new 2 meter bands, along with the microwave bands above 2300 MHz—were released back to the amateur community in November 1945. The 2½ meter band was withdrawn. In January 1946 the 420 to 430 MHz band (now expanded to 420–450 MHz) and the 1215 to 1295 MHz band were made available. In February the new 6 meter band was introduced. In March amateurs got to use the 11 meter band, and 235–240 MHz while awaiting reinstatement of 220 to 225 MHz. Return of the 80, 40, and 20 meter bands took longer and were completed in November 1946. Sharing arrangements were worked out for the 160 meter and 11 meter bands.

A new callsign assignment system went into effect on October 15, 1945. The nine callsign districts were replaced by ten. Licenses would be granted for five years, and amateurs no longer had to prove possession of equipment before getting their station license and callsign.

In 1947 George Sterling, W3DF, was appointed FCC Chief Engineer and later was appointed a Commissioner. He is the only licensed amateur radio operator ever to hold that post.

Amateur Radio Today

The 1950s and '60s saw AM radiotelephony replaced by single sideband emission. Radioteletype operation became a popular diversion from CW.

Provision was made in the mid-1960s to motivate amateurs to improve their electronics and operating knowledge by implementing an incentive licensing system. Many long-time amateurs were not too happy about having to take more tests in order to obtain spectrum they already earned before the advent of incentive licensing. Amateur radio growth stagnated in the 1960s and early 1970s, but rebounded dramatically during the CB craze of the mid 1970s.

FM and repeaters became very popular, and 2 meters replaced 80 meters as the local social-chat amateur band. The FCC began looking into establishing a "no-code" amateur radio license class in 1974, but decided against it in December 1983 on the basis that the amateur community did not want it. The ITU authorized new amateur bands at 12, 17, and 30 meters in 1979.

Amateur satellite operation came on strong in the 1980s, as did packet "computer-to-computer" radio. In 1983 astronaut Owen Garriott, W5LFL, became the first amateur to operate amateur radio from orbit. He was followed into space by Tony England, W0ORE, less than two years later. Today amateur radio operation from space is fairly common.

President Reagan signed legislation in 1982 providing for privatized amateur radio license testing. In 1983 the FCC began accepting applications from amateur radio organizations to take over the license examination program. An unsuccessful campaign was waged to save amateur radio access to the 220–222 MHz band. Amateurs did end up with exclusive rights to 222–225 MHz, however.

After a messy scandal in the mid 1970s, the FCC refused to consider issuing specific amateur callsigns in 1982. They have now changed their mind and will issue amateur callsigns of choice, but they will charge a fee.

A code-free amateur license was launched in 1991 with wide acceptance. The permissible amateur communications rules were changed last year and personal business communications may be conducted on the amateur bands. Today computers are more popular than code keys. The digital age is now upon us, and there is no telling where it might lead us.

73, Fred, W5YI

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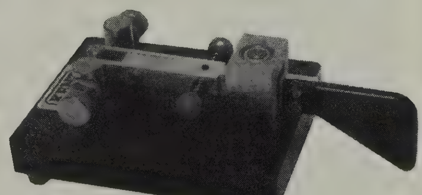

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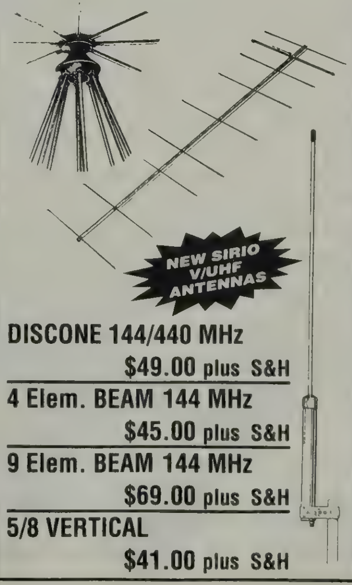

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PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

A Salute To CQ's 50th Anniversary

Having written the *CQ* Propagation Column monthly for the past 44 years, I am told that I am the "Dean" of the Editorial staff. As Dean, I salute *CQ* on its 50th anniversary. It has, in my opinion, brought more innovative and timely articles and columns to its readers than any other independent journal serving amateur radio.

I reminisce my experiences with *CQ* in the special section of this month's magazine devoted to the history of *CQ* and the history of amateur radio. But I would like to relate here how I joined *CQ* in March 1951. I do this as a special tribute not only to *CQ*, but to a person who helped bring this about, Bill Leonard, W2SKE. It is with deep sorrow that as I began this month's column I learned of Bill's untimely death on October 23 at the age of 78.

I had been an avid reader of *CQ* since the first edition of January 1945. Since my professional field was radio propagation, I found of particular interest the monthly Propagation column and articles written by Oliver Perry Ferrell. *CQ* was the first journal to recognize the importance of HF propagation predictions and forecasts for radio amateurs. Due to the pressure of his sporadic-E research project, Perry had to discontinue writing the Propagation column.

I had joined the Voice of America engineering staff in 1949, and was in charge of radio propagation. One of my tasks was to write a weekly propagation report for VOA listeners which was also featured in a weekly VOA broadcast for radio amateurs. The program was written by Gene Black, then W2ESO, now W2LL, who was also Editor of *CQ*. It was voiced by Bill Leonard, W2SKE, who was a journalist rising fast in the ranks of CBS. Gene Black asked me if I would care to re-establish the Propagation column in *CQ*, since a large amount of reader mail had been received asking that it continue.

Until that time, I had never written anything for general publication, and I had some doubts about it. It was Bill Leonard who built my confidence and urged that I do it. He reviewed the draft of my first column with a very critical eye. After a few rewrites, I submitted it to *CQ* and it appeared in the March 1951 issue.

The rest is history. The column has survived through four solar cycles, including Cycle 19, the highest ever recorded. This was the one that brought "once in a lifetime conditions" to the HF bands. I have written this column in more than two dozen countries as a result of travel required in my professional work as a Consulting Broadcast Engineer, and in two instances (in Vietnam and Israel) within range of the sound of gun fire.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for January 1995

	Expected Signal Quality			
Propagation Index...............	(4)	(3)	(2)	(1)
Above Normal: 7-8, 11, 16	A	A	B	C
High Normal: 4, 6, 9-10, 17, 24-25, 30	A	B	C	C-D
Low Normal: 2-3, 5, 12, 15, 21-23, 26-27, 29, 31	B	C	D	D-E
Below Normal: 1, 14, 18, 20, 28	C	C-D	D-E	E
Disturbed: 13, 19	C-D	D	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index,* use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair-to-poor (C-D) on January 1, fair (C) on the 2nd and 3rd, good (B) on the 4th, fair (C) on the 5th, etc.

CQ asked that I include "then and now" photos in this anniversary issue. The "then" photo was taken at the time when I decided to become Propagation Editor. It is also my tribute to Bill Leonard, W2SKE, who went on to become Director of News for CBS, and one of America's most respected electronic journalists. The "now" photo was recently taken in my Silver Spring, Maryland office.

1995: Fewer Sunspots As Cycle 22 Continues To Decline

The new year, 1995, will mark the beginning of the tenth year of sunspot cycle 22. On the average, the life of a sunspot cycle is approximately 11 years.

Flash

Regretfully, a radio storm broke out during the CQ World-Wide DX Contest SSB weekend of October 29–30, which lowered conditions considerably below what had been predicted. The storm was traced to a major solar flare which was first observed on October 25th. The intensity of the storm was rated severe in higher latitudes and minor in lower latitudes. The 24-hour planetary geomagnetic A-index rose to 49 on October 29, and dropped slightly to 41 on the 30th. The 10.7 cm solar flux level remained stable at 98. Based on initial results, it looks like HF propagation conditions during the contest weekend varied between Below Normal and Disturbed. More complete details will be given next month.

Cycle 22 began its life during September 1986 with a count of 12. It grew rapidly to a peak of just under 159 during July 1989, with a secondary peak a shade under 158 occurring during November of the same year. Cycle 22 is the third most intense solar cycle observed in the nearly 250 years in which records have been kept.

Since November 1989 the cycle has been declining slowly but steadily towards its demise, which is expected to take place during 1996. 1994 began with a smoothed sunspot number of 37 and was expected to drop to approximately 21 by the year's end.

The new year is expected to begin with a smoothed sunspot number of approximately 20 and continue to drop slowly, reaching approximately 13 by the end of the year.

What does this mean for HF propagation during 1995?

HF Propagation—1995

Compared to last year's moderate to low level of solar activity, conditions expected on the HF bands during 1995 may be noticeably different than they were at the same time last year, particularly on the higher frequency bands. Here is a thumbnail review of DX conditions expected during 1995 on each amateur band between 6 and 160 meters.

6 meters: F-2 layer ionospheric DX openings extremely unlikely.

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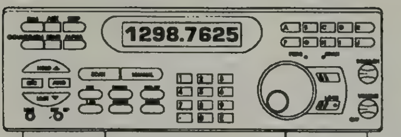

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Uniden GRANTXL-K SSB CB Mobile	$139.95
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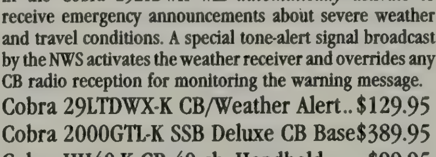

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The Weather Monitor II (7440-K) comes complete with anemometer with 40 feet of cable, external temperature sensor with 25 feet of cable, junction box with 8 feet of cable, AC-power adapter, detailed instruction booklet and one year limited factory warranty.

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Davis Rain Collector II 0.2 mm 7852M-K	$59.95
External Temperature/Humidity Sensor 7859-K	$99.95
Davis Anemometer Mast Mount 7890-K	$15.95
Weatherlink Software for IBM PC-Version 3.0 7862-K	$139.95
Weatherlink Software for Apple-Version 3.0 7866-K	$139.95
4-Conductor 40' (12.2 m) extension cable 7876-K	$17.95
6-Conductor 40' (12.2 m) extension cable 7878-K	$21.95
8-Conductor 25' (7.6 m) junction box cable 7880-K	$14.95
8-Conductor 50' (15.2 m) junction box cable 7881-K	$24.95
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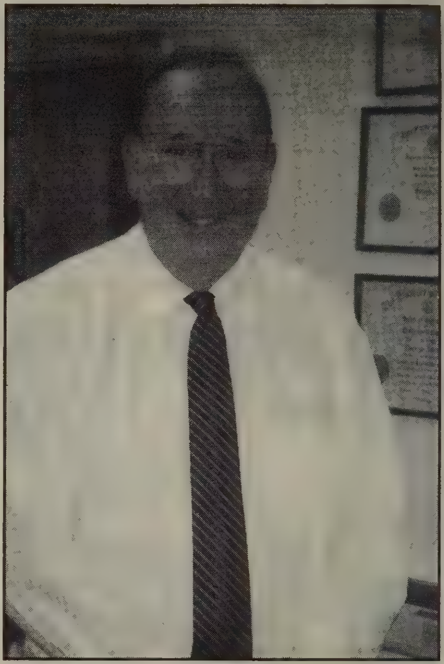
"Then": Late 1950 photo showing from left to right, George Jacobs (then W2PAJ, now W3ASK), Gene Black, then Editor of CQ (then W2ESO, now W2LL), Bill Leonard (W2SKE), and Bill Scherer, reviewing W2PAJ's weekly propagation forecast broadcast on the VOA radio amateur program. This became the basis for bringing back CQ's Propagation *column in March, 1951 under the editorship of George Jacobs.*



A recent photo of W3ASK, Dean of CQ's editorial staff, in his Silver Spring, Maryland office, where he is President of George Jacobs & Associates, Inc. Consulting Broadcast Engineers.

10 meters: Very few DX openings are expected on this band during 1995, but an occasional F-2 layer opening may be possible to some areas of the world during the daylight hours of the equinox and winter months.

12 meters: Should behave very much like the 10 meter band, but open somewhat more frequently.

15 meters: Despite considerably fewer openings, this is still expected to be a fairly good band for worldwide DX during the daylight hours of 1995, mainly during the equinox and winter months. Few east-west DX openings are expected during the summer months, but north-south openings may hold up.

17 meters: Should behave much like 15 meters, but open more often, remaining open for DX an hour or two longer.

20 meters: Not too much change from last year expected on this band during the hours of daylight, with world-wide DX openings possible throughout the year. DX conditions on this band tend to peak for a few hours after local sunrise, and again during the sunset period. During the winter months few nighttime DX openings are expected. During the summer months, however, fairly good nighttime DX should be possible, although it is likely to be more spotty than last year. Twenty meters will probably be the best all-around DX band during the new year.

30, 40, 80, and 160 meters: These are basically nighttime DX bands, and there is a tendency for propagation conditions to *improve* somewhat as solar activity decreases. Exceptionally good worldwide DX should be possible on 30 and 40 meters between sunset and sunrise, during all seasons, and on 80 and 160 meters during the equinox and winter months.

Sunspot Cycle 22 Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a monthly mean sunspot number of 27 for September 1994. This results in a smoothed running sunspot number of 34 centered on March 1994. A smoothed index of approximately 20 is forecast for January 1995. Canada's Dominion Radio Astrophysical Observatory in Penticton, B.C. reports a corresponding mean 10.7 cm solar flux level of 80 for September1994. This results in a smoothed level of 90 centered on March 1994. A level of approximately 81 is forecast for January 1995.

Table I is a listing of smoothed sunspot numbers observed to date for Cycle 22, the present solar cycle, and a forecast of activity expected through 1995.

January Conditions

Typically low solar activity, wintertime HF propagation conditions are expected to continue through January. The 10, 12, 15,

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
January		18	58	142	151	148	124	71	37	20*
February		20	65	145	151	148	116	69	35	19*
March		22	71	150	152	147	108	67	34	19*
April		24	78	154	149	146	103	64	33*	18*
May		26	84	157	147	146	100	60	31*	17*
June		28	94	158	144	145	97	56	30*	16*
July		31	104	159#	141	146	91	55	28*	15*
August		35	114	158	141	147	84	52	26*	15*
September	12	39	121	157	142	145	80	49	25*	14*
October	13	44	125	157	142	142	76	45	24*	14*
November	15	47	130	158	142	138	74	41	22*	13*
December	16	51	138	154	144	132	73	39	21*	13*

Table I– Progress of Sunspot Cycle 22 and predictions for 1994–1995. Predicted values are shown with asterisks. The peak of Cycle 22 is shown with #.

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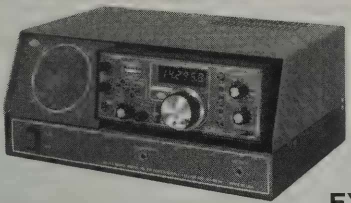

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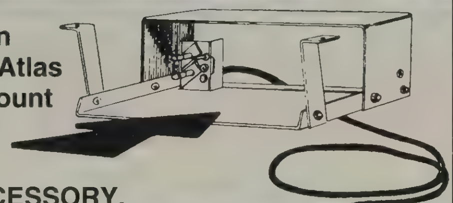

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HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

2. The propagation index is the number that appears in () after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:
(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate daylight time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between New York and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PDT zone; 3 hours in the MDT zone; 4 hours in the CDT zone; and 5 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to daylight time in other areas of the USA subtract 8 hours in the PDT zone; 7 hours in the MDT zone; 6 hours in the CDT zone; and 5 hours in the EDT zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 kw PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart January & February 1995 Local Standard Time At Path Mid-Point (24-Hour Time)

Band (Meters)	Distance Between Stations (Miles) 50-250	250-750	750-1300	1300-2300
10	Nil	Nil	10-15 (0-1)	10-15 (1) 15-16 (0-1)
15	Nil	10-16 (0-1)	08-10 (0-1) 10-15 (1-2) 15-16 (1) 16-18 (0-1)	08-09 (1) 09-10 (1-2) 10-15 (2-3) 15-16 (1-2) 16-18 (1) 18-19 (0-1)
20	Nil	08-10 (0-1) 10-12 (0-2) 12-14 (0-3) 14-16 (0-2) 16-22 (0-1)	06-07 (0-1) 07-08 (0-2) 08-10 (1-4) 10-12 (2-4) 12-14 (3-4) 14-16 (2-4) 16-17 (1-3) 17-18 (1-2) 18-22 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (4-3) 14-16 (4) 16-17 (3-4) 17-18 (2-3) 18-19 (1-2) 19-20 (1)
40	07-09 (0-1) 09-10 (1-3) 10-11 (3) 11-15 (3-4) 15-16 (3) 16-18 (1-2) 18-20 (0-1)	07-08 (1-2) 08-09 (1-3) 09-11 (3-4) 11-15 (4-3) 15-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-02 (0-2) 02-07 (0-1)	07-08 (2) 08-09 (3-1) 09-11 (4-1) 11-15 (3-1) 15-16 (4-2) 16-18 (3-4) 18-20 (2-4) 20-02 (2-3) 02-07 (1-2)	07-08 (2-1) 08-15 (1-0) 15-16 (2) 16-18 (4-3) 18-20 (4) 20-02 (3-4) 02-04 (2-3) 04-07 (2)
80	07-08 (1-2) 08-09 (3-4) 09-18 (4) 18-21 (2-3) 21-23 (1-2) 23-03 (1) 03-07 (0-1)	07-08 (2) 08-10 (4-2) 10-16 (4-1) 16-18 (4-2) 18-21 (3-4) 21-23 (2-3) 23-03 (1-3) 03-07 (1-2)	07-08 (2-1) 08-10 (2-0) 10-16 (1-0) 16-18 (2-1) 20-21 (4) 21-23 (3-4) 23-03 (3) 03-07 (2) 18-20 (4-3)	07-08 (0-1) 08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-23 (4) 23-03 (3) 03-06 (2) 06-07 (2-1)
160	09-17 (1-0) 17-19 (3-2) 19-05 (4) 05-07 (3) 07-09 (2-1)	17-18 (2-1) 18-19 (2) 19-21 (4-3) 21-05 (4) 05-06 (3) 06-07 (3-1) 07-09 (1-0)	17-18 (1-0) 18-19 (2-1) 19-21 (3-1) 21-03 (4-3) 03-05 (4) 05-06 (3-2) 06-07 (1) 07-08 (1-0)	18-19 (1-0) 19-21 (2-1) 21-03 (3) 03-05 (4-2) 05-06 (2) 06-07 (1-0)

ALASKA Opening Given in GMT#

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	21-23 (1)	18-22 (1) 22-00 (2) 00-02 (1)	03-10 (1) 10-12 (2) 12-13 (1)	07-12 (1)
Central USA	20-23 (1)	18-22 (1) 22-00 (2) 00-02 (1)	03-11 (1) 11-13 (2) 13-14 (1)	07-12 (1)
Western USA	20-00 (1)	17-18 (1) 18-22 (2) 22-00 (3) 00-01 (2) 01-03 (1)	04-05 (1) 05-12 (2) 12-15 (1) 15-16 (2) 16-17 (1)	05-12 (1) 12-15 (2) 15-17 (1) 12-15 (1)*

HAWAII Openings Given in HST#

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	06-07 (1) 07-08 (2) 08-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-03 (2) 03-04 (1)	19-21 (1)* 21-01 (2) 01-03 (1) 23-02 (1)*
Central	06-07 (1) 07-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	17-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1)	19-20 (1) 20-22 (2) 22-01 (3) 01-03 (2) 03-05 (1) 23-03 (1)*
Western USA	12-15 (1)† 06-07 (1) 07-08 (2) 08-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	16-18 (1) 18-19 (2) 19-22 (4) 22-02 (3) 02-04 (2) 04-09 (1)	19-20 (1) 20-22 (2) 22-04 (3) 04-05 (2) 05-07 (1) 22-05 (1)*

**Indicates best times for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.*
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

and 17 meter bands are expected to open less often than last January. Twenty meters openings should remain about the same, while somewhat improved band conditions may be noticed on 30, 40, 80, and 160 meters. Atmospheric noise levels (static) are expected to be at their lowest values of the year in the northern hemisphere, and signal levels should be exceptionally strong during band openings.

10 and 12 meters: A few DX openings should still be possible to southern and tropical regions during the daylight hours, with signals peaking during the afternoon. A very occasional opening towards Europe and the east may be possible between 8 and 11 AM, and towards the Far East during the late afternoon. Some short-skip openings, between approximately 1300 and 2300 miles, are also forecast for the afternoon hours.

17 and 15 meters: Fairly good 15 and 17 meter DX openings are forecast to many areas of the world during the hours of daylight. Fairly consistent short-skip openings, as a result of regular F-layer reflection, are also expected during the daylight hours for distances ranging between approximately 1000 and 2300 miles.

20 meters: Openings to most areas of the world are forecast for 20 meters sometime between sunrise and the late afternoon hours. Signals are expected to peak for about an hour or two after sunrise and again during the afternoon. Good short-skip openings over distances ranging between 750 and 2300 miles should be possible. Occasionally the band should remain open toward southern and tropical areas into the evening hours.

30 and 40 meters: DX openings should begin during the late afternoon hours, with conditions peaking during the hours of darkness and at sunrise. Atmospheric noise, or static, should remain at low seasonal levels during the month, and signals often may be exceptionally strong. Good short-skip openings are also forecast during the hours of daylight over distances ranging between approximately 150 and 750 miles. As darkness falls, the short-skip range should increase to between 1000 and 2300 miles.

80 meters: With low static levels continuing through the month, fairly good DX openings are expected to many areas of the world during the hours of darkness. During the daylight hours short-skip should be possible up to about 300 miles. During the hours of darkness, the skip should increase, with openings possible between distances of approximately 400 and 2300 miles. It may be a toss-up between 80 and 40 meters for the best DX band openings during the late evening and early morning hours.

160 meters: A considerable improvement is expected in propagation conditions on this band during January. Fair DX openings are forecast to many areas of the world from a few hours after sundown to shortly before sunrise. Short-skip openings up to 2300 miles should also be possible during the hours of darkness. Because of extremely high solar absorption in this frequency range, even during the periods of low sunspot activity ionospheric propagation generally is not possible on 160 meters during the daylight hours.

Remember the following rule for 30, 40, 80, and 160 meter DX openings. Conditions on these bands maximize as the sun rises on the eastern terminal of a path. For example, for openings between North America and Europe, conditions should be optimum as the sun rises in Europe. For openings between the South Pacific and North America, look for the strongest signals as the sun rises over North America.

Short-Skip Charts

This month's column contains a Short-Skip Propagation Chart for use between distances of approximately 50 and 2300 miles. Special charts for use between the mainland and Alaska and Hawaii are also included. Instructions for use of these charts are given elsewhere in this column. DX charts for January appeared in last month's column.

VHF Ionospheric Openings

There is a fairly good chance for some meteor-scatter-type openings during the first week of January when the *Quadrantids* meteor shower is expected to take place. This is usually a major shower, and it should peak on the 2nd and 3rd with about 30 to 40 meteors entering the earth's atmosphere each hour.

January is generally a poor month for VHF ionospheric propagation. Auroral activity is usually at a low seasonal level, and there is little sporadic-*E* activity expected. Best bet for ionospheric openings are on days when HF conditions are expected to be Below Normal or Disturbed. These appear in the Last Minute Forecast at the beginning of this column.

73, George, W3ASK

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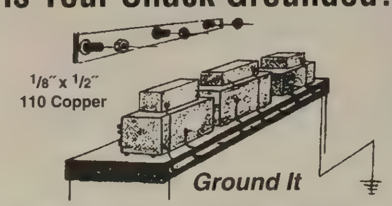

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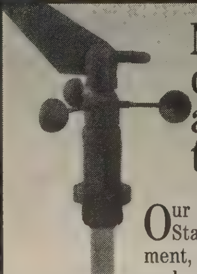

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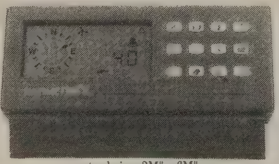
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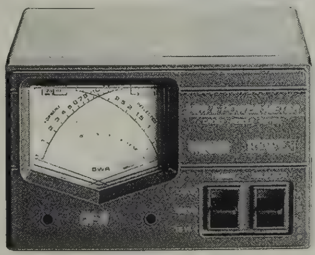

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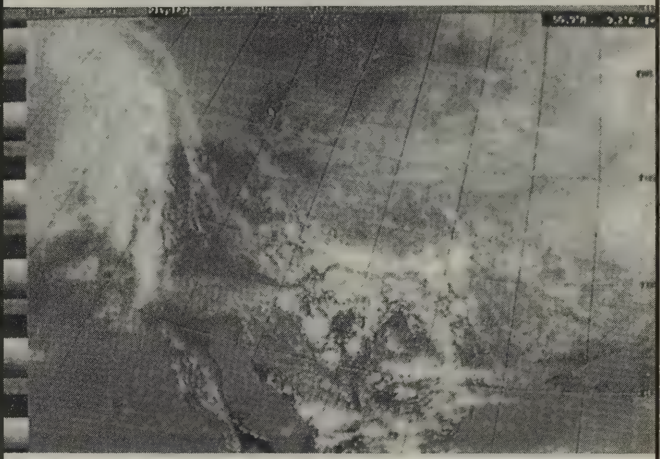

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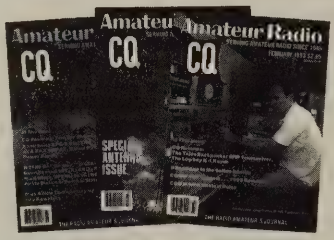

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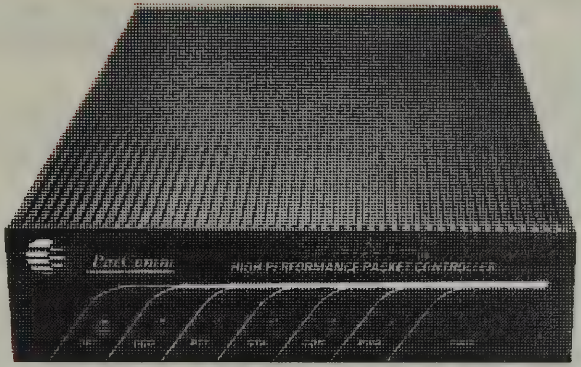

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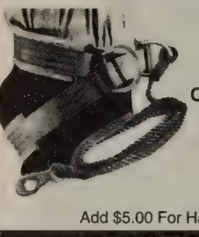

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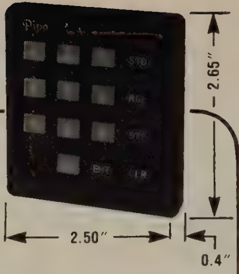

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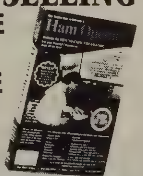

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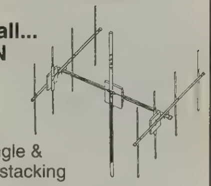

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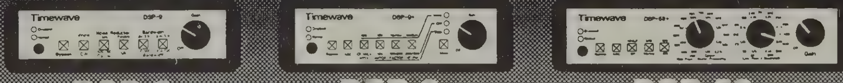

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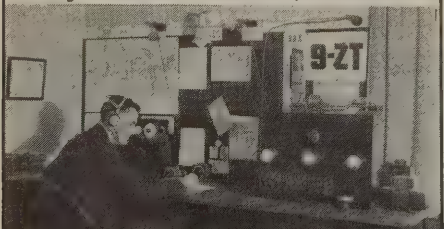

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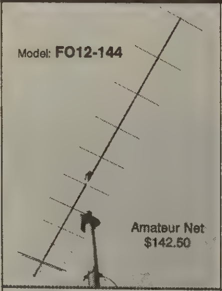

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F/B ratio	22 dB
Maximum power	2000 Watts
Impedance	50 ohm

MECHANICAL SPECIFICATIONS:

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WANTED: Gear train from R4-C receiver or junker R4-C; clean Hammarlund HQ-215 RX; inexpensive transverters for 144 and 435 MHz for Sat. work; VFO adjustment tool for 75A-3; 50S and 60S film (converted to VHS video) of ham radio operations—Field Day, contests, etc., especially if participants can be identified. Dave Heil, A22MN, Gaborone/Dept. of State, Wash., D.C. 20521-2170. State lowest acceptable price first letter.

1995 CALLBOOKS. "FLYING HORSE." North American, $24.95; International, $24.95. Both, $48.95. '94 Callbooks, $12.95/ea. **Buckmaster** HamCall CD-ROM, $36.95. '95 ARRL Handbook, $25.95. ARRL Antenna Book (17th edition), $25.95. Add $3/order for shipping. AA6EE—Callbook Distributor, 16832 Whirlwind/C1, Ramona, CA 92065 (619-789-3674). (COD extra.)

TRANSCEIVERS: Kenwood TS430S $600, TS520S $375, TS820S $475, TS830S $600. Yaesu FT101E $375. K1BW, 508-537-7195.

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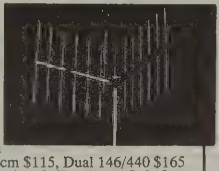

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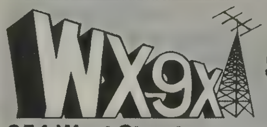

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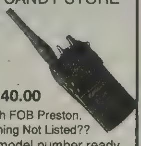

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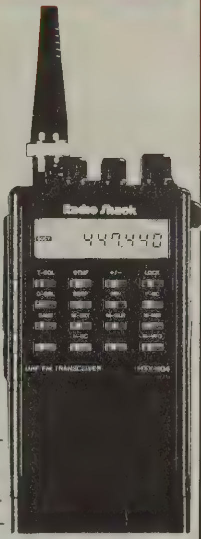

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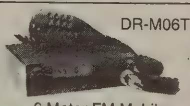

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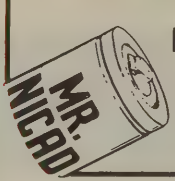

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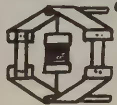

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CRYSTALS: SASE for my list. K8LJQ, 2023 Lannen Road, Howell, MI 48843.

WANTED: ICOM IC-SP2 Speaker, Yaesu FT-225RD w/memory, and C-30/C-43 ARC-5 Control Units. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

ATTENTION DRAKE COLLECTORS: I have for sale a nice Drake TR-7 station. It consists of the TR-7 with 3 filters, heavy-duty power supply, RV-7 remote VFO, MS-7 speaker, and the MN-7 tuner. All is in very good condition with manual and service manual. $650 takes the entire package. I prefer pickup but will ship at your risk. You may fax me a reply at 404-396-0276, or write KD4AJ @ 1968 Huntington Hall Court, Atlanta, Georgia 30338. I will respond to every inquiry.

WANT TO EXCHANGE: Mint new TL-922 with spare tubes for any modern solid-state transceiver. Anton Koval, Box 322, Cherkassy 257000, Ukraine, Eastern Europe.

MURCH UT2000B $195. Ten-Tec 540 $319. Drake MS4 $59. Bencher, Simpson 260 VOM, Commodore 1541 $49 ea. Exc., U-ship. List $1 & SASE. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

FOR SALE: KENWOOD TS-940S with antenna tuner, mint, with 500 Hz CW filters, $1500; HEATH SB 220 linear amplifier, $575. Buyer pays shipping. Original owner: Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

FOR SALE: QST/HR/73 & misc. publications. SASE. KA1VY, Ernie Guimares, P.O. Box 1262, Lakeville, MA 02347-7262.

FOR SALE: DJ-160 2 meter handie-talkie comes with manual, 3 batteries (1 standard and 2 heavy duty). Reason for selling: got a DJ-580 and don't need two HT's. Price $150.00. For more info send SASE to: P.O. Box 518, Whitehouse, FL 32220.

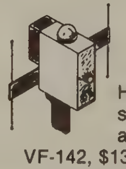
FREQ. COUNTER, phone patch, var. capacitors, textbooks, radio, physics, art books, much more. Lists, SASE. Bill Tucker, W4FXE, 1965 S. Ocean Dr. 15-G, Hallandale, FL 33009 (305-456-1349).

WANTED: SWAN 250 manual/copy. Call WB7DEJ, 504-641-2779, or 1434 Ridgecrest Dr., Slidell, LA 70458.

SONY ICF2010 Digital SW/Air Receiver US$250, Sony ICF2003 Digital SW Receiver US$150, SONY AIR-7 Air/PSB/AM/FM Digital Scanner US$100, SONY AN71 Compact SW Antenna US$15. VE7BFX, #51-10771 Auburn Drive, Richmond, B.C., V7A-4X7, Canada (604-272-1825).

WANTED: Tektronix Scope plug-in 1L10 or 1L20 RF Spectrum Analyzer. Call 606-236-6510. WQ4Z, George Griebe, 650 Chestnut, Parksville, KY 40464-9624.

COLLECTORS: Hamilton "Lever-Set" Railroad pocket watch, 21 jewels, inside is gold-plated. GOOD condition. Make offer by letter ONLY. Bill, K8TBW.



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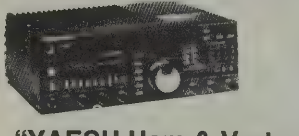

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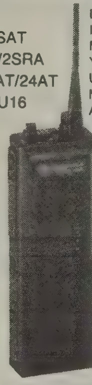

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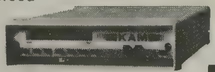

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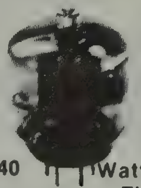

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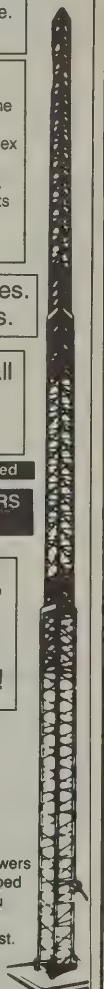

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Our Readers Say

KC3YB Battery Pack Correction

Editor, *CQ:*

Thank you for publishing my article "Build A Virtually Indestructible Battery Pack" in the November 1994 issue of *CQ.* Unfortunately, through an error which is entirely mine, a mistake in the amount of voltage drop in 12 and 18 gauge wire was printed. I am fully aware that the resistance of standard solid-conductor copper wire is 1.588 and 6.385 ohms per 1000 feet, respectively. At one amp, this would produce a drop of .004 volts for 2 feet of 12 gauge wire and .012 volts for 2 feet of 18 gauge wire.

In order to salvage some shred of credibility, I would admonish the would-be builder of my battery pack to keep an eye on the net voltage loss caused by wire, springs, connectors, etc. This can indeed amount to a significant loss. I regret this error and can only attribute it to a power surge through my calculator. My thanks to fellow hams who pointed it out to me.

John R. Somers, KC3YB
Crisfield, MD

A REAL Ham Station

Editor, *CQ*:

In your "Zero Bias" October 1994 issue you wrote about wondering if the ham shacks in some pictures you see are really always that neat. I wanted to send you a picture of me in my shack and point out some of the projects I'm working on as a result of articles I have read in your fine magazine.

Joe Sanburn, WA9PSV, in his "real" ham shack in Warsaw, Indiana. Note the equipment made using articles in CQ.

Starting top left on the shelf: Heath DX-40, Hallicrafters SX-122, and on top of the R-51 speaker is a 40 meter fun machine near completion from the articles by Paul Carr, N4PC, which appeared in *CQ.* From the left on the desk, and hard to see, are a Heath VF-1 VFO with a keyer on top of it, Heath HM-102 SWR/PWR meter, Yaesu FT-77, CDE rotor control, and Astron RS-20A power supply.

In front of me is a reproduction, I am working on, of my first transmitter. I acquired my original from a dear friend, Jack Landis, K9VZA, now a Silent Key. He was one of my Elmers and was of great help to me over the years. Articles by Dave Ingram, K4TWJ, inspired me to put this transmitter back together. It has a 6AG7 oscillator and 6L6 amp. To my right is a Heath Two'er, a Motorola 6 FM, and a Gonset III 6 AM rig. There are two Heath Sixers on the desk I am restoring.

Thanks for your magazine and those who write for you. Keep up the good work.

Joe Sanburn, WA9PSV
Warsaw, IN

Calling JY1!

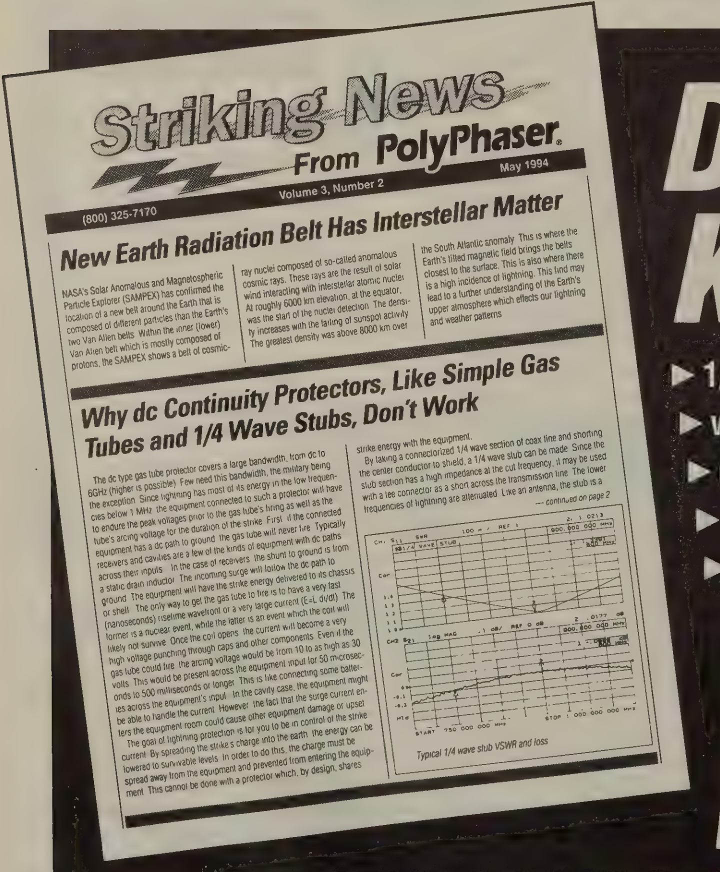
Editor, *CQ*:

Here I send you a slide for possible publishing about a connection between amateur radio and the President of the Republic of Finland.

Calling JY1!! From the left are President of the Republic of Finland, Mr. Martti Ahtisaari;

"Calling JY1," an event held in connection with the Opening Ceremony of the 25th Annual Conference of the International Institute of Comunications, September 1994. (Photo via Seppo Sisättö, OH1VR)

(Continued on page 232)


Striking News
From PolyPhaser®
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New Earth Radiation Belt Has Interstellar Matter

NASA's Solar Anomalous and Magnetospheric Particle Explorer (SAMPEX) has confirmed the location of a new belt around the Earth that is composed of different particles than the Earth's two Van Allen belts. Within the inner (lower) Van Allen belt which is mostly composed of protons, the SAMPEX shows a belt of cosmic-ray nuclei composed of so-called anomalous cosmic rays. These rays are the result of solar wind interacting with interstellar atomic nuclei. At roughly 6000 km elevation, at the equator, was the start of the nuclei detection. The density increases with the falling of sunspot activity. The greatest density was above 8000 km over the South Atlantic anomaly. This is where the Earth's tilted magnetic field brings the belts closest to the surface. This is also where there is a high incidence of lightning. This find may lead to a further understanding of the Earth's upper atmosphere which effects our lightning and weather patterns.

Why dc Continuity Protectors, Like Simple Gas Tubes and 1/4 Wave Stubs, Don't Work

The dc type gas tube protector covers a large bandwidth, from dc to 6GHz (higher is possible). Few need this bandwidth, the military being the exception. Since lightning has most of its energy in the low frequencies below 1 MHz, the equipment connected to such a protector will have to endure the peak voltages prior to the gas tube's firing as well as the tube's arcing voltage for the duration of the strike. First, if the connected equipment has a dc path to ground, the gas tube will never fire. Typically receivers and cavities are a few of the kinds of equipment with dc paths across their inputs. In the case of receivers, the shunt to ground is from a static drain inductor. The incoming surge will follow the dc path to ground. The equipment will have the strike energy delivered to its chassis or shell. The only way to get the gas tube to fire is to have a very fast (nanoseconds) risetime wavefront or a very large current (E=L di/dt). The former is a nuclear event, while the latter is an event which the coil will likely not survive. Once the coil opens, the current will become a very high voltage punching through caps and other components. Even if the gas tube could fire, the arcing voltage would be from 10 to as high as 30 volts. This would be present across the equipment input for 50 microseconds to 500 milliseconds or longer. This is like connecting some batteries across the equipment's input. In the cavity case, the equipment might be able to handle the current. However, the fact that the surge current enters the equipment room could cause other equipment damage or upset.

The goal of lightning protection is for you to be in control of the strike current. By spreading the strike's charge into the earth, the energy can be lowered to survivable levels. In order to do this, the charge must be spread away from the equipment and prevented from entering the equipment. This cannot be done with a protector which, by design, shares strike energy with the equipment.

By taking a connectorized 1/4 wave section of coax line and shorting the center conductor to shield, a 1/4 wave stub can be made. Since the stub section has a high impedance at the cut frequency, it may be used with a tee connector as a short across the transmission line. The lower frequencies of lightning are attenuated. Like an antenna, the stub is a

— continued on page 2

Typical 1/4 wave stub VSWR and loss

Do You Know...

- ▶ 1/4λ stub protectors ring with lightning energy?
- ▶ which material shields lightning's H field?
- ▶ dc continuity RF protectors don't work?
- ▶ why single point grounding works best?
- ▶ about latent equipment damage?

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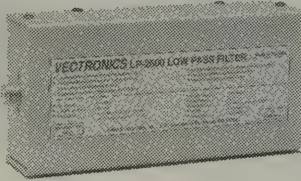

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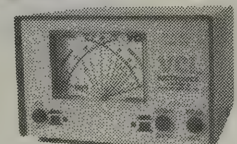
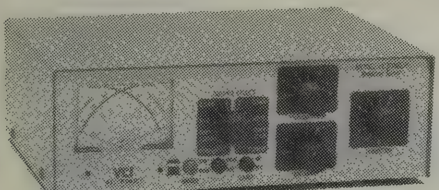
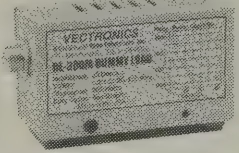


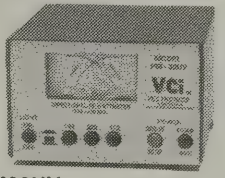
PM30
300W/3kW Wattmeter



VC300DLP
300W Antenna Tuner

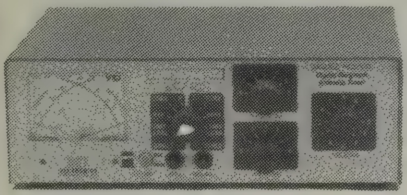


DL300M
300W Dummy Load

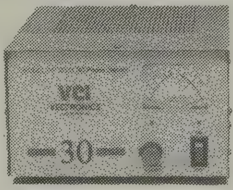


PM30UV
30W/300W Wattmeter

DL650M
1500W Dummy Load



VC300D
300W Digital Antenna Tuner



PS30VM
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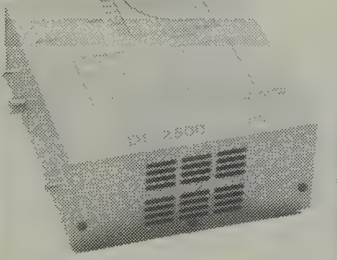
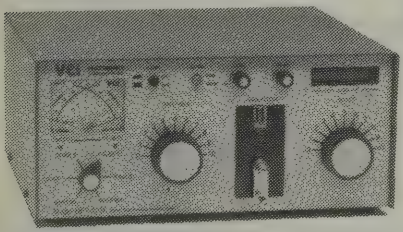
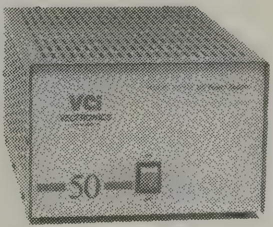


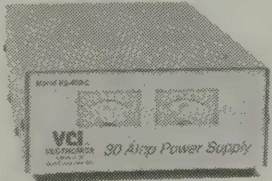
DL2500
2500W Dummy Load



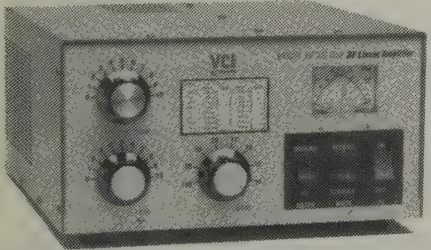
HFT1500
1500W Antenna Tuner



PS50F
13.8Vdc 50A Linear Power Supply



PS400C
13.8Vdc Switching Power Supply



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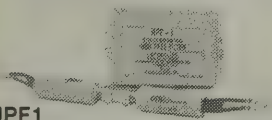

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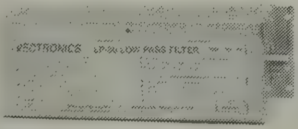

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CIRCLE 179 ON READER SERVICE CARD

Our Readers Say

(from page 230)

Dr. Seppo Sisättö, OH1VR (past President of SRAL); Mr. Kari Leino, OH2BC; and Mr. Raino Hassinen, OH2LYJ. "Calling JY1" happened in Tampere on September 6, 1994 in connection with the Opening Ceremony of the 25th Annual Conference of International Institute of Communications.

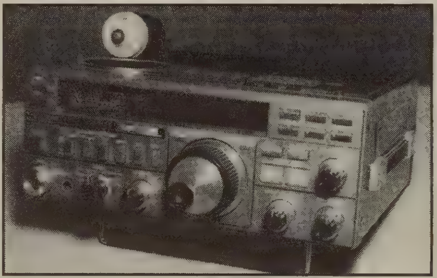
Seppo Sisättö, OH1VR
Tampere, Finland

Recycle Those Cans!

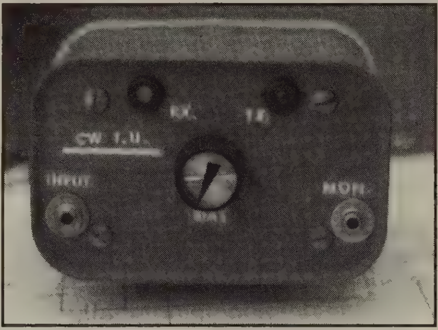
Editor, *CQ*:

I enjoyed your "Zero Bias" comments on recycling in the October issue of *CQ*.

My efforts as shown in *CQ*, November '49 and June '57 were directed toward the larger Command Set WW II surplus items. However, the recycle habit has never left me. As examples of uses for discarded every-day products, I'm including a few photos.



This 35mm film container houses a visual CW offset indicator used with an FT-757GX transceiver. An incoming signal tuned to light the LED (with RIT off) assures transmit frequency will match frequency of incoming CW signal. (Photo via W6OWP)

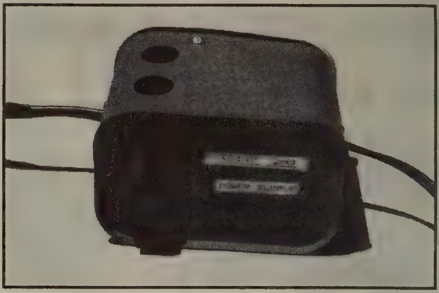


An experimental CW T.U. for use with a computer and CW program. (Photo via W6OWP)

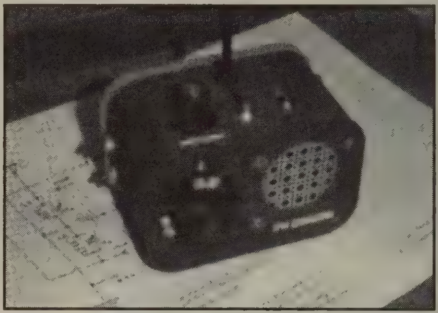
The larger items are all housed in familiar Hills Brothers or MJB coffee cans—the familiar Bavarian Mint or Fudge Moca specialities (my wife's favorites). The 35mm film container provides the enclosure for a visual CW offset indicator shown with a Yaesu 757GX. I believe I've been a continuous *CQ* subscriber since returning from overseas in 1946. Unfortunately, it's been impossible to maintain a complete file because of numerous QTH changes. I'm looking forward to the January issue. I'm sure it will bring back a lot of memories.

F.A. Bartlett, W6OWP
Paradise, CA

PS: Your *CQ* QTH is familiar, as I got my start in commercial radio copying press from the Press Wireless transmitters at Hicksville.



I'm not overly fond of plug-in wall modules. Here's the transformer for an early VIC-20 computer with a plug-in line cord, switch, and "on" indicator light. (Note: There are actually only two leads. I only used a single light and forgot about the shadows that would result). (Photo via W6OWP)



An RF-sensed CW monitor. I built this because in some of the xcvrs I've worked with, the sidetone fails to accurately depict the on-the-air signal. (Photo via W6OWP)

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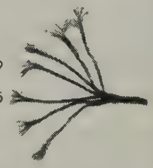

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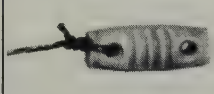

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ANNOUNCEMENTS

(from page 8)

Jan. 8, **West Allis Radio Amateur Club 23rd Annual Midwinter Swapfest**, Waukesha Co. Expo Center Forum, Milwaukee, Wisconsin. For tickets or information, write with SASE to WARAC SWAPFEST, P.O. Box 1072, Milwaukee, WI 53201. (Exams.)

Jan. 14, **Ninth Annual S.W. Ohio Digital Symposium**, Thesken Hall, Miami University, Middletown Campus, Middletown, Ohio. For info, Hank Greeb (N8XX@KC8TW.OH.USA, CompuServe 72277,706), 6580 Dry Ridge Road, Cincinnati, OH 45252 (513-385-8363); or Carl Morgan, K8NHE@KC8TW.OH.USA.

Jan. 14, **Dutch Country Computer and Communications Show**, Lancaster Host Golf Resort and Conference Center, Lancaster, Pennsylvania. For more information, contact the Dutch Country Computer and Communications Show, P.O. Box 682, East Petersburg, PA 17520 (phone 717-872-0857; FAX 717-872-0857). (Exams.)

Jan. 14–15, **16th Annual Sarasota Hamfest and Computer Show**, Robarts Sports Arena, Sarasota Fairgrounds, Sarasota, Florida. For more information, contact Edward Neely, KC4RYC, 2632 Sunnyside St., Sarasota, FL 34239 (813-366-5564). (Exams.)

Jan. 15, **Giant Electronic Flea Market**, Lincoln High School, Yonkers, New York. For further information contact Metro 70 cm. Network, 53 Hayward St., Yonkers, NY 10704 (914-969-1053). (Exams.)

Jan. 15, **Richmond Frostfest '95**, The Showplace, 3000 Mechanicsville Turnpike, Richmond, Virginia. For more information, contact Martin Gary, KR4JG, days 804-288-1945, evenings 804-227-3440, FAX 804-288-1353. (Exams; handicapped accessible.)

Jan. 21, **Northwest Missouri Winter Hamfest**, Ramada Inn, St. Joseph, Missouri. Contact Northwest Missouri Winter Hamfest, P.O. Box 182, Cameron, MO 64429. (Exams.)

Jan. 21, **14th Annual Hammond Hamfest**, Southeastern Louisiana University, Hammond, Louisiana. Contact SELARC Hamfest, P.O. Box 1324, Hammond, LA 70404. (Exams.)

Jan. 22, **NCARC Winter Superfest**, Larimer County Fairgrounds, Loveland, Colorado. For information, contact Randy Long, WB6AVV, 303-226-1529; or Musser Moore, AA0PB, 303-221-3698. (Exams.)

Jan. 28, **Tennessee Valley Amateur Radio Network Hamfest**, Civic Center, Gallatin, Tennessee. Contact Bill Ferrell, N4SSB, 1120 Douglas Bend Rd., Gallatin, TN 37066 (615-452-3962). (Handicapped accessible; exams by preregistration only. Send 610, copy of license or certificate of successful completion, SASE to Ronnie Gilley, 512 Hillside Drive, Gallatin, TN 37066).

Jan. 29, **Tusco ARC Hamfest**, Ohio National Guard Armory, Dover, Ohio. Contact Howard Blind, KD8KF, 6288 Echo Lake Rd., NE, New Philadelphia, OH 44663 (phone 216-364-5258).

Jan. 29, **The Maryland Mobileers ARC (MMARC) Swapfest and Flea Market**, Odenton Fire Hall, Odenton, Maryland. Contact Tom Wilkison, KA3OMU, 592 Eason Dr., Severn, MD 21144 (410-969-2639 evenings). (Exams, preregistrsation Jerry Gavin, NU3D, 7801 Overhill Rd., Glen Burnie, MD 21060; 410-761-1423).

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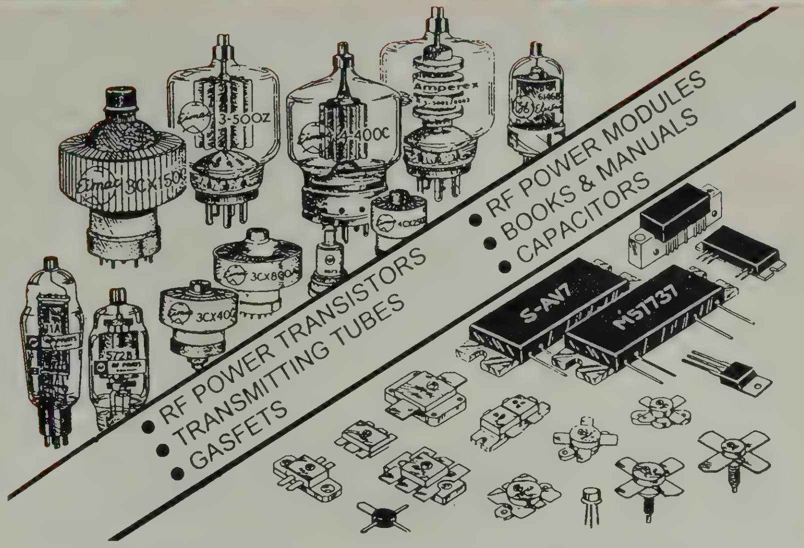

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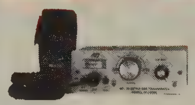

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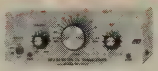

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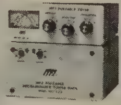

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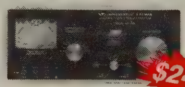

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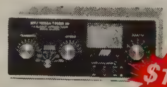

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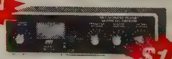

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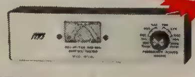

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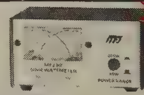

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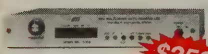

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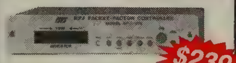

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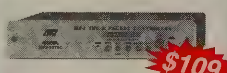

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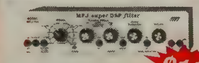

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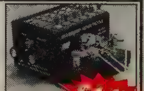

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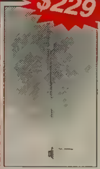

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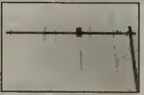

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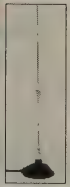

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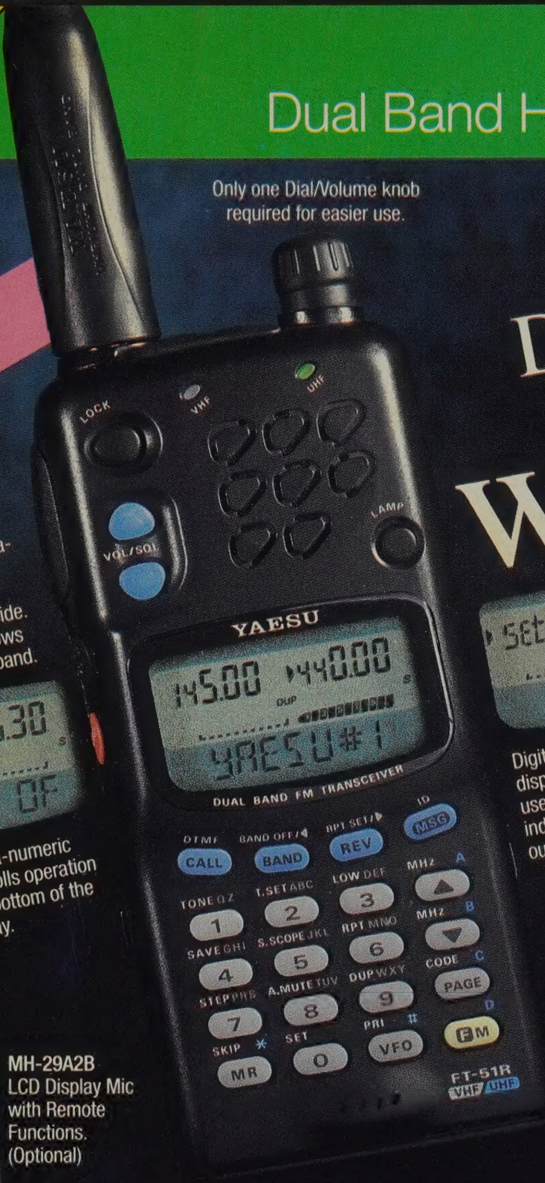

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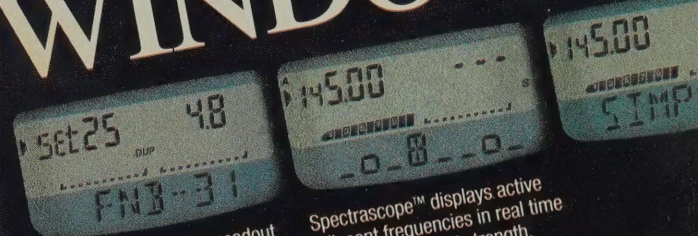

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- Up/Down Volume/Squelch Controls & Display
- Selectable Sub-Band TX Mute
- Automatic Tone Search (ATS)
- Digital Battery Voltage Display
- AM Aircraft Receive
- Scanning Light System (SLS)
- 120 Memory Channels (80 w/Alpha-Numeric)
- Large Backlit Keypad & Display
- Automatic Repeater Shift (ARS)
- Multiple Scanning Modes
- 3 Selectable Scan Stop Modes with Scan Skip
- Selectable 6-way Lock Functions
- Automatic Power Off (APO)
- TX/RX Battery Savers Built-in
- Handy Cloning Feature
- 5 Selectable Power Output Levels
- 5 Watt and 2 Watt versions
- Selectable RX Smart Mute™
- Cross-Band & One-Way Repeat Functions
- DTMF Paging/Coded Squelch Built-in

Accessories
Consult your local dealer.

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MFJ-8621
2 Meter Packet Only Transceiver Up To 9600 baud and 5 watts

MFJ

MFJ-9420X
20 Meter SSB Travel Radio With 12 Watts And Includes Dynamic Microphone

MFJ

MFJ-9040,9030, 9020,9017, 9015
CW Transceivers For 40,30,20,17 and 15 Meters Built-In Speaker and 5 Watts Output

MFJ

MFJ-9140B,9130B,9120B, 9117B, 9115B

Complete CW Stations Incl. Xcvrs, Tuner and Power Pack

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MFJ-971
Portable Antenna Tuner

MFJ-4114
Portable Battery/AC Power Pack

TUNERS

$292
MFJ-989C
3KW Roller Inductor Tuner Cross-Needle Meter, Built-In Dummy Load Matches 160-10 Meters

$242
MFJ-986
3Kw Roller Inductor Tuner Easy-To-Use, 1.8-30MHz, Cross-Needle Meter

$195
MFJ-962C
1.5 Kw Versa Tuner III Cross-Needle SWR/Power Meter, Handles 1500W PEP 6-Position Ant. Switch

$119
MFJ-949E
1.8-30MHz Antenna Tuner World's Best Selling Amateur Tuner Dummy Load, 8-Pos. Ant. Switch.

NEW

$144
MFJ-934
Antenna Tuner/Artificial Ground Covers 1.8-30MHz, Up To 300 Watts Turns A Random Wire Into An Effective Ant. That Works

SWR METERS

$189

MFJ-259
HF/VHF SWR Analyzer w/ RF Resistance Meter 1.8-170MHz, 10 Digit LCD Frequency Counter

$165
MFJ-249

1.9-170MHz SWR Analyzer 10 Digit LCD Frequecy Counter Smooth Tuning

$59
MFJ-815B
1.8-60MHz SWR/Wattmeter 200/2000W w/Forward 50/500W Reflected MFJ-817 Covers 144 &440MHz

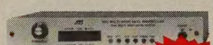
NEW

MFJ-864
SWR/Wattmeter covers 1.8-60, 144 And 440MHz Read Forwad And Reflected Power Simultaneously

NEW

MFJ-860
HF SWR/Wattmeter Covers 1.8-60MHz MFJ-862 Same As Above For 144,220 And 440MHz

PACKET


$259
MFJ-1278B
Multi-Mode Data Controller Pactor, Color SSTV, Packet, AMTOR, RTTY, ASCII, Navtex, CW Plus More

$239
MFJ-1276
Packet Plus PACTOR Contoller. HF/VHF TNC Precision Tuning and 32K Mailbox Memory

$205
MFJ-1270CQ
Packet Controller VHF/HF Packet TNC With New 9600 baud Capability

$109
MFJ-1270C
Packet Contoller VHF/HF Packet TNC TAPR TNC-2 Compatible Free AC Power Supply

MFJ-1272B
TNC/Mic Switch. Push Button Switch For Choosing Your Microphone Or TNC. HF, VHF Or UHF

SUPER BUYS

$198
MFJ-784
Super DSP Filter Automatically Eliminates Heterodynes, Reduces Noise and Interference On Nearly Any Mode

NEW

$117
MFJ-452
CW Keyboard, 2 Line LCD Display, CW Keyboard, Iambic Keyer

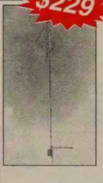
$119
MFJ-493
Menu Driven Memory Keyer/Keyboard. Save And Play Messages, Set Speed, Weight, Sidetone Etc. Plus 32,000 Character Memory

MFJ-490
Memory, Keyer/ Bencher Paddle Combo.

$147
Message Memories, Morse Trainer, Sidetone, Auto. Serial Numbering Plus Bencher Paddle

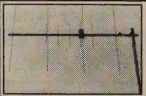
$69.95
MFJ-411
Personal Morse Code Tutor. Battery Or 110VAC, Beginners Course, Random QSO Mode, Customized Practice Plus More

ANTENNAS

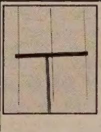
$229

MFJ-1798
10 Band Vertical No Ground Or Radials 75/80, 40,30, 20,1715,12, 10,6 and 2M, Low Radiation Angle

$249

MFJ-1786
Super Hi-Q Loop Antenna 36 Inch Diameter, 10-30MHz Continuous Coverage. Incl. Auto Band Selection Remote Auto-Tuner


$44
MFJ-1768
5 Element 144/440MHz Yagi Strong 6061-T6 Aluminum 5' Boom, Covers Entire 2M and 440MHz Bands With Low SWR

MFJ-1724B
2 Meter/440MHz Mag Mount Low SWR/ Across Both Bands, Stainless Steel Radiator 19 Inches Tall, 300 Watt PEP


MFJ-1763
3 Element, 2 Meter Beam Sturdy And Easily Portable, 23/4 Ft. Boom, Mount Vertically or Horizontally, Great For Packet

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Holiday Sale!

$50. CASH OFF!
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One of each?

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Big or small, Yaesu's got 'em all!

$30. CASH OFF!
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- FT-2500M
- FT-2200

A gift for someone special, like you?

The Yaesu Holiday Sale is on! Cash off, at the register! From October 1, 1994 through January 8, 1995! Don't miss these great savings on 15 super Yaesu products from the exciting FT-1000D to the popular FT-11R! See your Yaesu dealer for details and fill those holiday wish lists now!

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FT-2500M/FT-7400H 2m/70cm Mobiles

DX-CARIBE CRUISE '95
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Yaesu USA today!
1995

Specifications

- **Frequency Coverage:**
  FT-2500M
    RX: 140-174 MHz
    TX: 144-148 MHz
  FT-7400H
    RX/TX: 430-450 MHz
- Rugged Military Spec Design
- Advanced Track Tuning (ATT)
- Selectable Alpha-Numeric Display
- Largest Display Available
- Power Output:
  FT-2500M 50/25/5 Watts
  FT-7400H 35/20/5 Watts
- Flip Up Front Control Panel Hides Seldom Used Buttons
- Backlit DTMF Mic
- 31 Memory Channels
- CTCSS Encode Built-in
- Automatic Power Off (APO)*
- Time-Out Timer (TOT)*
- Manual* or Automatic Backlighting Adjustment
- **Accessories:**

FTS-17A	CTCSS Decode Unit
FRC-6	DTMF Paging Unit
SP-4	External Speaker
FP-800	Power Supply

*FT-2500M

"No other mobile has a Military spec rating. This radio can really take it!"

"New Omni-Glow display and backlit DTMF Mic, too. Both Yaesu 'firsts'!"

"3-stage advanced track tuning really reduces intermod. Its great!"

"Yaesu did it again."

Performance beyond the call of duty.

Just when you thought you had the most formidable mobile built, we made the FT-2500M – the next evolution of powerful, rugged mobile radios.

The FT-2500M takes the durable quality, features, and performance of the popular FT-2400H and goes one better! A new easy-to-operate front panel design with rubber coated knobs, new, large state of the art Omni-Glow display to provide enhanced viewing at all angles and light levels, and Yaesu's exclusive 3-Stage Advance Track Tuning feature that reduces intermodulation and front-end overload puts the FT-2500M as close as you can get to commercial grade performance in amateur frequencies.

The FT-2500M is the only mobile with a Military spec rating and the most often used controls on the front and those you "set and forget" neatly hidden. It's the first mobile radio with a backlit DTMF mic, too. With its extra large heat sink and one-piece die-cast chassis, the tough FT-2500M is unlike any other mobile in its class.

Test the mettle of your mobile. If it doesn't measure up to the endurance standards of the U.S. Military, get the FT-2500M. For flawless performance in rough and rugged situations, the FT-2500M is really formidable – just what you'd expect from Yaesu. See it at your dealer today!

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FT-2200/7200

Just 5.5"W x 1.6"H x 6.5"D, the FT-2200/7200 radios are designed to fit into today's more compact cars with ease.

SPECIFICATIONS • Frequency Coverage: FT-2200 RX: 110-180 MHz, TX: 144-148 MHz. FT-7200 RX/TX: 430-450 MHz. • Wide Receiver Coverage: 110-180 MHz • AM "Aircraft" Receive: 110-139 MHz • Built-in DTMF Paging/Coded Squelch • Selectable Channel Only Display • 10 Memory DTMF Auto Dialer • Backlit DTMF Mic • Power Output 50/25/5 Watts (FT-7200 35 Watts) • 50 Memory Channels • Remote Operation w/ Optional MW-2 • CTCSS Encode Built-in • Optional Digital Voice Storage System. Accessories: See your authorized Yaesu dealer.

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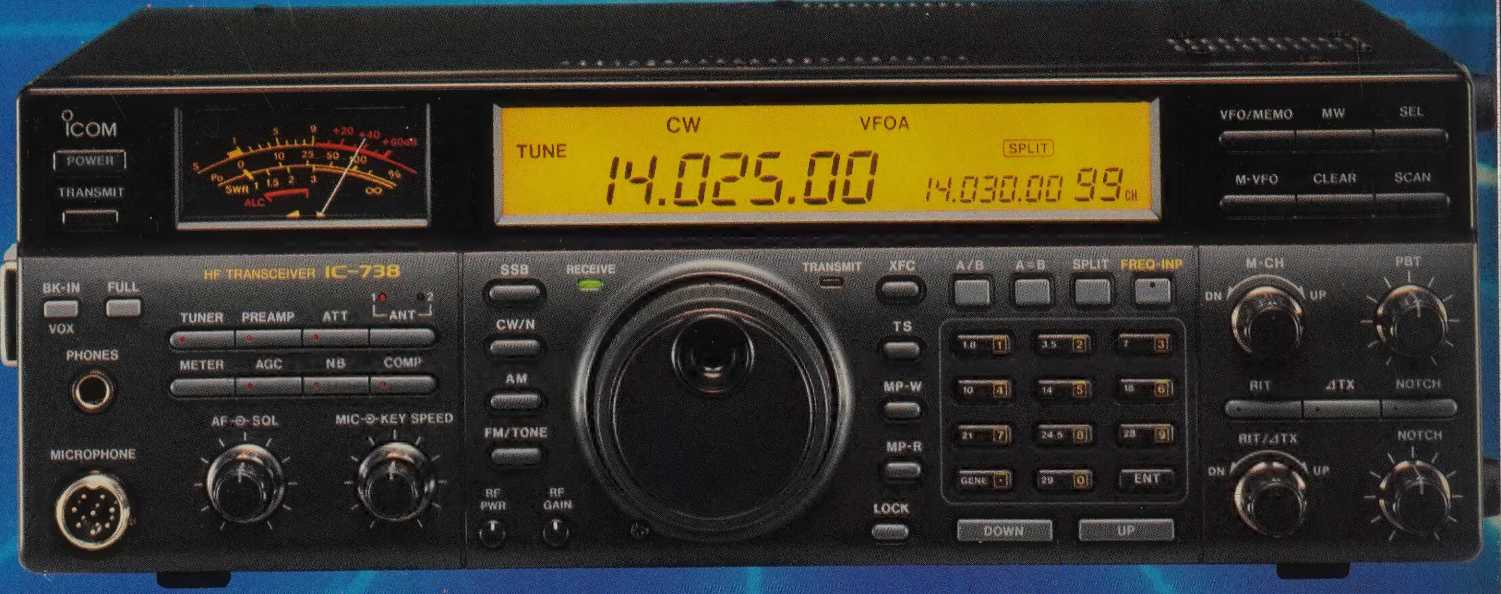
IC-738 THE NEXT GENERATION



Don't let your contest results depend on "previous generation" technology. Get the Dxer's advantage with the "Next Generation" IC-738.

FEATURES

- ☐ New DDS Technology
- ☐ 100W (SSB, CW, FM)
  40W AM Standard
- ☐ AT-170 High Speed Automatic Antenna Tuner (160-10 Meters)
- ☐ Two Antenna Connectors (Front Panel Switchable)
- ☐ 4 Function Meter (SWR/ALC/PO/S)
- ☐ VOX
- ☐ RF Gain
- ☐ Pass Band Tuning
- ☐ Notch Filter
- ☐ 10 Electronic Scratch Pad Memories
- ☐ 101 Memory Channels (10 split, 2 scan edge)
- ☐ RIT/ΔTx Functions
- ☐ Quick Split w/Simultaneous Display
- ☐ Speech Compressor
- ☐ Attenuator (20 db)
- ☐ Pre Amplifier (20 db)
- ☐ Double Band Stacking Registers
- ☐ Set Mode Menu to Customize Operation
- ☐ Menu Selectable CW Filters
- ☐ Noise Blanker
- ☐ Fast/Slow AGC
- ☐ High Dynamic Range/Low Distortion
- ☐ Built-in Electronic Keyer
- ☐ Direct Keyboard Entry
- ☐ Hand Microphone Included (HM-36)
- ☐ Computer Control Port (CI-V)

NEXT GENERATION TECHNOLOGY

Next Generation Circuitry	**DDS (Direct Digital Synthesis)** ICOM's unique DDS IC is used for the LPL Circuit. High tech and compact, the PLL unit improves frequency resolution to 1 Hz step. You'll experience an analog feeling of the tuning, faster PLL lockup times, improved phase noise blocking and high dynamic range.
Next Generation Tuner	**AT-170 Advanced Tuner** Preset memories, in 100kHz steps, provide very high speed tuning. "Automatic re-tune" turns the AT-170 on, and tunes, when SWR exceeds 1.5:1 "Through inhibit" permits tuning at SWR conditions up to 3:1 (when your antenna can't be tuned to 1.5:1). "Sensitive/Normal" gives you the choice of minimum possible SWR or 1.5:1. This eliminates tuning each time you transmit, unless desired.
Next Generation Duty Cycle	**100% Full Duty** The final power amplifier outputs a stable 100 W in SSB, CW and FM modes. The aluminum die cast frame, large heatsink and innovative twin cooling fan system stabilize the PA circuit to ensure 100% duty cycle operation.
Next Generation Frequency Management	**Quick Split Operation** Pre-programmable offsets, simultaneous display of Tx and Rx frequencies and XFC (Transmit Frequency Change) give you a competitive edge when calling Dx stations operating split frequencies. "Split Lock" permits changes in your transmit frequency while protecting your receive freqeuency against accidental changes.
Next Generation CW Operation	**CW Contest Package** Our built-in electronic keyer with separate key jack, full break-in (QSK) and separate jacks for an extended CW key or memory keyer, make a competitive package for CW contesting. For example, use a memory keyer (or TNC with CW capability) to make contacts easily, then use your paddle for normal operation.

ICOM America, Inc. Corporate Headquarters 2380-116th Ave. N.E., Bellevue, WA 98004

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